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THE

WONDERS OF ART;

CONTAINING

AN ACCOUNT

OF

CELEBRATED ANCIENT RUINS; FORTIFICATIONS; PUBLIC EDIFICES; MONUMENTS;

AND SOME OF

THE MOST CURIOUS AND USEFUL INVENTIONS IN MODERN TIMES.

DESIGNED FOR THE INSTRUCTION OF YOUNG PERSONS.

BY THE REV. J. L. BLAKE, D. D.

"This huge rotundity we tread grows old,
And all those worlds that roll around the sun."

4688.

TROY, N. Y.:
PUBLISHED BY YOUNG & HARTT.
1845.

Entered according to Act of Congress, in the year 1845, by
REV. JOHN L. BLAKE, D. D.,
In the Clerk's Office of the District Court for the Southern District of New York.

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PREFACE.

Had we never seen or heard of a common watch, on first being presented with one we should think it a wonderful production. But as we have been familiar with it from childhood, we think little or nothing of it. We feel no admiration for it, unless it have some extra workmanship or decorations about it. In that case we think far more of its glittering diamonds, and of its richly embossed ornaments, than we do of its ingenious and perfect mechanism. This is precisely the same as it is in surveying the works of nature. We scarcely give a thought to that portion which we have always seen in profusion, and which has been made the subject of investigation, although it be the star-bespangled heavens which hang over our head like a curtain—or the green earth spread under our feet, like a richly wrought carpet.

Hence, while endeavoring to arrest the attention of readers, and especially of young readers, we endeavor to present such objects as they may not have heard of, or with which they are not familiar, to the neglect of other matters in themselves more worthy of attention. This consideration has guided the editor, in the preparation of the following little volume. It is made up also in reference to persons of different grades of literary attainment. Nor should those most advanced in knowledge, imagine it is not designed to answer the purpose intended, because some of the articles to themselves are stale; to tens of

thousands less favored than themselves, these very articles will be new, and will carry to their minds all the charms of novelty.

And further to adapt the volume to the diversified tastes and literary attainments of the readers for whom it is designed, it is made up of materials ancient and modern—useful and curious; so that if a portion of them find a part of it uninteresting to themselves, they will find another part of it possessed of all desirable attractions. Indeed, if the same reader should find a fifth part only of the volume thus interesting to himself, he may think himself well compensated in the perusal of it. We ought not to expect that each of us will find every sentence, and every paragraph, and every page of the book we read, will be alike good mental food for us all. The bee is unable to convert into honey all that it gleans even from the beautiful flower. Nor does the miner, in digging up the earth, find the precious metals free from alloy.

The aspirant for knowledge must be contented with similar results; and must labor patiently to treasure up the good, while passing over or casting away what is of less or of no value to himself. It is believed that this volume to all such will be acceptable; and if so, the compiler will be abundantly satisfied.

New York, *Sept.* 1*st*, 1845.

CONTENTS.

	Page.
Noah's Ark,	7
The Tower of Babel,	12
Ruins of Ancient Babylon,	15
The Ruins of Palmyra,	25
The Ruins of Balbec,	29
The City of Jerusalem,	33
The Pyramids of Egypt,	35
The Ruins of Herculaneum,	38
Ruins of Pompeii,	44
Pompey's Pillar,	55
Coliseum of Rome,	60
Aqueducts,	62
The Appian Way,	65
The Chinese Wall,	66
Balloons,	69
The Tower of London,	72
The Croton Water-works,	85
Paper Making,	95
Canals,	103
Imperial Canal of China,	109
Erie Canal, New York,	111
Percussion Locks,	118
The Pendulum,	120
The Use of Parchment,	122
The Art of Dyeing,	123
Curious Automatons,	128
Automaton Chess Player,	130
Automaton Musicians,	135

PAGE.
Automaton seated at a Pianoforte,..... 138
Automaton Coach and Horses,..... 140
Automaton Singing Bird,..... 141
St. Peter's Church at Rome,..... 142
St. Paul's Church, London,..... 146
Westminster Abbey,..... 149
The Iron Steam-ship Great Britain,..... 154
Herschell's Grand Telescope,..... 163
Fortress of Gibraltar,..... 164
Ancient Roads,..... 167
Railroads,..... 169
The Shoemadoo at Pegu,..... 179
American Antiquities,..... 184
Invention of Steamboats,..... 191
First-rate Man-of-War, ... 196
Curious Clock at Strasburg,..... 198
Clocks in the form of Chariots,..... 200
Mechanical Theatre,..... 202
Bunker Hill Monument,..... 203
United States Capitol,..... 209
New York City Hall,..... 212
Pennsylvania Old State House,..... 216
Fortifications of Quebec,..... 218
Catacombs of Rome,..... 222
History of Manufactures,..... 227
Working of Metals,..... 230
Manufacture of Glass,..... 232
Manufacture of Porcelain,..... 234
Capitol of New Hampshire,..... 235
Anatomical Dissections,..... 238
Porcelain Tower of Nankin,..... 240
Egyptian Tombs and Mummies,..... 241
Burial-places near Constantinople, ... 249

WONDERS OF ART.

NOAH'S ARK.

An ark is a vessel to swim upon the water, usually applied to that in which Noah and his family were preserved from the universal deluge. The ark has afforded several points of curious inquiry among the critics and naturalists relative to its form, capacity, materials, and other particulars. The wood of which it was built is called in the Hebrew, gopher-wood, and in the Septuagint, square timber. Some translate the original cedar, others pine, and others box. Pelletier prefers cedar, on account of its durability and the great plenty of it in Asia; whence Herodotus and Theophrastus relate, that the kings of Egypt and Syria built whole fleets of it instead of deal.

The learned Mr. Fuller, in his Miscellanies, has observed, that the wood whereof the ark was built was nothing but the cypress-tree; for, taking away the termination, keepar and gopher differ very little in sound. This observation the great Bochart has confirmed, and shown very plainly that no country abounds so

much with this wood as that part of Assyria which lies about Babylon.

In what place Noah built and finished his ark is no less a matter of disputation. But the most probable opinion is, that it was built in Chaldea, in the territories of Babylon, where there was so great a quantity of cypress in the groves and gardens in Alexander's time, that the prince built a whole fleet of it for want of other timber. And this conjecture is confirmed by the Chaldean tradition, which makes Xisuthras (another name for Noah) set sail from that country. The time taken to build the ark is also much disputed, some making it fifty-two years; others seventy-eight, one hundred, and one hundred and twenty. The Mahommedans say it was constructed in two years.

The dimensions of the ark, as given by Moses, are 300 cubits in length, fifty in breadth, and thirty in height; which some have thought too scanty, considering the number of things it was to contain; and hence an argument has been drawn against the authority of the relation. To solve this difficulty, Buteo and Kircher have proved geometrically, that taking the common cubit of a foot and a half, the ark was abundantly sufficient for all the animals supposed to be lodged in it. Snellius computes the ark to have been above half an acre in area. Dr. Arbuthnot computes it to have been 81,062 tons.

It contained, besides eight persons of Noah's family, one pair of every species of unclean animals, and seven pairs of every species of clean animals, with provisions for them all during the whole year. The former appears, at first view, almost infinite; but if we come to a calculation, the number of species of animals will be found much less than is generally imagined; out of which, in this case, are excepted such animals as can live in the water; and Bishop Wilkins shows that only seventy-two of the quadruped kind needed a place in the ark.

By the description Moses gives of the ark, it appears to have been divided into three stories, each ten cubits or fifteen feet high; and it is agreed on as most probable, that the lowest story was for the beasts, the middle for the food, and the upper for the birds, with Noah and his family; each story being subdivided into different apartments and stalls, though Josephus, Philo, and other commentators, add a kind of fourth story under all the rest; being, as it were, the hold of the vessel, to contain the ballast, and receive the filth and fæces of so many animals; but F. Calmet thinks that which is here reckoned a story was no more than what is called the keel of the ship, and served only for a conservatory of fresh water.

Drexelius makes 300 apartments; F. Fournier, 333; the anonymous author of the questions on Genesis, 400; Buteo, Temporarius,

Arius, Montanus, Hostus, Wilkins, Lamy, and others, suppose as many partitions as there were different sorts of animals. Pelletier makes only seventy-two, viz. thirty-six for the birds, and as many for the beasts.

As to the number of animals contained in the ark, Buteo computes that it could not be equal to 500 horses; he even reduces the whole to the dimensions of fifty-six pairs of oxen. F. Lamy enlarges it to sixty-four pairs of oxen, or 128 oxen; so that, supposing one ox equal to two horses, if the ark had room for 256 horses, there must have been room for all the animals. But the same author demonstrates that one floor of it would suffice for five hundred horses, allowing nine square feet to a horse.

As to the food in the second story, it is observed by Buteo, from Columella, that thirty or forty pounds of hay ordinarily suffice for an ox a day; and that a solid cubit of hay, as usually pressed down in our hayricks, weighs about forty pounds; so that a square cubit of hay is more than enough for one ox in one day. Now, it appears that the second story contained 150,000 solid cubits; which divided between 206 oxen will afford each more hay by two-thirds than he can eat in a year.

Bishop Wilkins computes all the carnivorous animals equivalent, as to the bulk of their bodies and their food, to twenty-seven wolves; and all the rest to 280 beeves. For the former he allows 1825 sheep; and for the latter 109,500

cubits of hay; all which will be easily contained in the two first stories, and a deal of room to spare. As to the third story, nobody doubts of its being sufficient for the fowls, with Noah, his sons and daughters.

Upon the whole, the learned bishop remarks, that of the two it appears much more difficult to assign a number and bulk of necessary things to answer the capacity of the ark, than to find sufficient room for the several species of animals already known to have been there. This he attributes to the imperfection of our list of animals, especially of those of the unknown parts of the earth; adding, that the most expert mathematician at this day could not assign the proportion of a vessel better accommodated to the purpose than is here done, and hence he concludes that the capacity of the ark, which had been made an objection against scripture, ought to be esteemed a confirmation of its divine authority; since in those ruder ages men, being less versed in arts and philosophy, were more obnoxious to vulgar prejudices than now; so that had it been a human invention, it would have been contrived according to those notions which form a confused and general view of things, as much too big as it had been represented too little.

Besides the places requisite for the beasts and birds, and their provisions, there was sufficient room, therefore, for Noah's household utensils, instruments of husbandry, and seeds

to sow after the deluge; for which purposes he might spare room in the third story for thirty-six cabins, besides a kitchen, a hall, four chambers, and a space about forty-eight cubits in length to walk in.

THE TOWER OF BABEL.

It is not, in the least, to be doubted, that Noah and his family, for some years after the flood, continued to reside in the neighborhood of the mountains of Armenia, where the ark had rested. But his descendants, in course of time, having a numerous progeny, the greater part of them quitted this place, and directing their course eastward came at length to the plains of Shinar, on the banks of the river Euphrates. Attracted by the convenience of its situation and the natural fertility of the soil, they resolved not to proceed any farther, but to make this their fixed place of residence.

Having formed this resolution, in order to render themselves famous to future generations, they determined to erect a city, and in the city a building of such stupendous height as should be the wonder of the world. Their principal motives in doing this were, it is supposed, to keep themselves together in one body, that by their mutual strength and councils, as the world increased, they might bring others

under their subjection, and thereby become masters of the universe.

The idea of the intended tower gave them the most singular satisfaction, and the novelty of the design induced them to enter upon its construction with the greatest alacrity. One inconvenience, however, arose, of which they were not at first apprized, namely, there being no stone in the country with which to build it. But this defect was soon supplied by the nature of the soil, which being clayey they soon converted into bricks, and cemented them together with a pitchy substance called *bitumen*, the country producing that article in great abundance. As the artificers were numerous, the work was carried on with great expedition, and in a short time the walls were raised to a prodigious height. But the Almighty being dissatisfied with their proceedings, thought proper to interpose and totally put an end to their ambitious project; so that the fruit of their vanity became only a monument of their folly and weakness.

Though the descendants of Noah were at this time exceedingly numerous, yet they spoke the same language. In order, therefore, to render their understanding ineffectual, and to lessen the towering hopes of those aspiring mortals, the Almighty formed the resolution of confounding their language. In consequence of this, a universal jargon took place, and the different dialects caused such a distraction of

thought, that, incapable of understanding or making known to each other their ideas, they were thrown into the utmost disorder.

By this awful stroke of divine justice, they were not only deprived of prosecuting their intended plan, but of the greatest pleasure a social being can enjoy, namely, mutual converse and agreeable intercourse. We are not, however, to suppose that each individual had a peculiar dialect or language to himself; but only the several tribes or families, which are supposed to have been about seventy in number. These, detaching themselves according to their respective dialects, left the spot, which, before the consequences of their presumption, they had considered as the most delightful on earth, and took up their temporary residences in such places as they either pitched on from choice, or were directed to by chance.

Thus did the Almighty not only defeat the designs of those ambitious people, but likewise accomplish his own, by having the world more generally inhabited than it otherwise could have been. The spot on which they had begun to erect their tower, was, from the judgment that attended so rash an undertaking, called *Babel*, (afterwards *Babylon*,) which, in the Hebrew tongue, signifies *confusion*.

The confusion of tongues and dispersion of the family of Noah, happened 101 years after the flood, as is evident from the birth of Peleg, the son of Heber who was the great-grandson

of Shem, and was born in the 101st year after that memorable period. He received his name from this singular circumstance, the word *Peleg*, in the Hebrew language, signifying *partition*, or *dispersion*.

The descendants of Noah being now dispersed, in process of time, from their great increase, they scattered themselves to distant parts of the earth, and, according to their respective families, settled in different parts of the world. Some took up their residence in Asia; some in Africa; and others in Europe. By what means they obtained possession of the several countries they inhabited, the sacred historian has not informed us. It is, however, natural to suppose, that their respective situations did not take place from chance, but from mature deliberation; and that a proper assignment was made of such and such places, according to the divisions and subdivisions of the different families.

RUINS OF ANCIENT BABYLON.

The city of Babylon, the capital of the ancient kingdom of Babylonia, is supposed to have been situated in N. Lat. 32° 34′, and in E. Long. 44° 12′ 30″. It was founded by the first descendants of Noah, 2,234 years before Christ; enlarged by Nimrod, the great-grandson of Noah, 2,000 years, B. C.; and in a manner

completely rebuilt, about 1,200 years before Christ, by the Assyrian queen, Semiramis. It was greatly strengthened and beautified by various succeeding sovereigns; but it was by Nebuchadnezzar, and his daughter Nitroscis, that it was brought to such a degree of magnificence and splendor, as rendered it one of the wonders of the world.

Babylon stood in the midst of a large plain, in a very deep and fruitful soil. It was divided into two parts by the river Euphrates, which flowed through the city from north to south. The old city was on the east, and the new city, built by Nebuchadnezzar, on the west side of the river. Both these divisions were enclosed by one wall, and the whole formed a complete square, 480 furlongs in compass. Each of the four sides of this square had twenty-five gates of solid brass, at equal distances; and at every corner was a strong tower, ten feet higher than the wall. In those quarters where the city had the least natural defence, there were also three of these towers between every two of the gates; and the same number between each corner and the nearest gate on its two sides.

The city was composed of 50 streets, each 15 miles long and 150 feet broad, proceeding from the 25 gates on each side, and crossing each other at right angles; besides four half streets, 200 feet in breadth, surrounding the whole, and fronting towards the outer wall.

It was thus intersected into 676 squares, which extended four furlongs and a half on each of their sides, and along which the houses were built at some distance from each other. These intermediate spaces, as well as the inner parts of the squares, were employed as gardens and pleasure-grounds; so that not above one half of the immense extent which the walls enclosed was occupied by buildings.

The walls of Babylon were of extraordinary strength, being 87 feet broad, and 350 high. They were built of brick, and cemented by a kind of glutinous earth called bitumen, which had the quality of soon becoming as hard as stone. These walls were surrounded on the outside by an immense ditch, from which the earth had been dug to make the bricks, and which, being always filled with water, added very much to the defence of the city.

On each side of the river Euphrates was built a quay, or high wall of the same thickness with the walls around the city. There were gates of brass in these walls opposite to every street which led to the river; and from them were formed descents, or landing-places, by means of steps; so that the inhabitants could easily pass in boats from one side of the city to the other. There was also a remarkable bridge thrown over the river, near the middle of the city, built with wonderful art, of huge stones, fastened together by means of iron chains and melted lead; and it is said to

have been a whole furlong in length, and thirty feet in breadth.

In order to prevent any inconvenience from the swellings of the Euphrates, two canals were cut from that river at a considerable distance above the town, which carried off the superabundant waters into the Tigris. From the place where these canals commenced, down the sides of the river, both above and below the city, immense banks were constructed to confine the stream still more effectually within its channel, and to prevent still more completely all danger of an inundation. In order to facilitate the construction of these works, an immense lake was dug on the west side of Babylon, about 40 square miles, and 35 feet deep, into which the river was turned by a canal till the banks were completed, and it was then restored to its former course.

At the two ends of the bridge over the Euphrates were two magnificent palaces, which had a subterraneous communication with each other, by means of a vault or tunnel under the river. The old palace, on the east side, was about thirty furlongs in compass, and was surrounded by three separate walls, one within the other, with considerable spaces between them. The new palace, on the opposite side, was about four times as large as the other, and is said to have been eight miles in circumference.

The most remarkable structure in the new

palace was tne hanging gardens, which Nebuchadnezzar is said to have raised in order to give his wife, Amytis, daughter of Astyages, king of Media, some representation of the beautiful mountainous and woody scenes which abounded in her native country. These gardens occupied a square piece of ground 400 feet on every side, and consisted of large terraces raised one above the other, till they equalled in height the walls of the city. The ascent from terrace to terrace was by means of steps ten feet wide, and the whole pile was sustained by vast arches, and strengthened on each side by a solid wall, twenty-two feet in thickness. Within these arches were very spacious and splendid apartments, which are described as having commanded a very extensive and delightful prospect.

There was so great a depth of earth, that the largest trees might take root. Here was every thing that could please the sight; the largest trees, flowers, plants, and shrubs. On the highest terrace was an aqueduct supplied with water from the river; from whence the whole garden was watered. It is affirmed that Nebuchadnezzar undertook this wonderful and famous edifice out of complaisance to his wife Amytis, the daughter of Astyages; who being a native of Media, retained strong inclinations for mountains and forests, which abounded in her native country.

Near to the old palace stood the temple of

Belus; and in the middle of the temple was an immense tower, about 600 feet in height, and the same number square at the foundation. This huge pile of building consisted of eight towers, each 75 feet high, placed one above the other, and gradually decreasing towards the top like a pyramid. The ascent to the summit was accomplished by stairs on the outside, in a sloping direction, and of a spiral form; and these, winding eight times round the whole, produced the appearance of as many towers regularly contracting their diameter. In the different stories were many lofty apartments, supported by pillars, and used as temples in the worship of Baal; and on the top of all was erected a complete observatory for astronomical purposes. What has been described is understood to have been the old Tower of Babel; but it was greatly enlarged by Nebuchadnezzar, who built around its base a number of other sacred edifices, forming a square nearly three miles in compass.

The city of Babylon seems to have excelled in rich and ingenious manufactures at a very early period in the history of the world; and its goodly garments are mentioned 1,450 years before Christ, (Joshua vii. ver. 21; and 2 Sam. xiii. ver. 18.) For the space of 26 years after the death of Nebuchadnezzar, it continued to retain its glory, and was at once the seat of an imperial court, the station of a numerous garrison, and the scene of a most extensive

commerce. It was at length invested, about 540 years before Christ, by the victorious armies of Cyrus the Great. Crowded with troops for their defence, surrounded with such lofty walls, and furnished with provisions for twenty years, the citizens of Babylon derided the effects of their besieger, and boasted of their impregnable situation.

On the other hand, the conqueror of Asia, determined to subdue his only remaining rival in the empire of the eastern world, left no expedient untried for the reduction of the city. By means of the palm-trees which abounded in that country, he erected a number of towers higher than the walls, and made many desperate attempts to carry the place by assault. He next drew a line of circumvallation around the city, divided his army into twelve parts, appointed each of these to guard the trenches for a month, and summoned his enemy to surrender. After spending two years in this blockade, he was presented with an opportunity of effecting his purpose by stratagem.

Having learned that a great festival was to be celebrated in the city, and that it was customary with the Babylonians on that occasion to spend the night in drunkenness and debauchery, he posted part of his troops close by the spot where the river Euphrates entered the city, and another at the place where it went out, with orders to march along the channel whenever they should find it fordable.

He then detached a third party to open the head of the canal which led to the great lake already described, and, at the same time, to admit the river into the trenches which he had drawn around the city.

By these means the river was so completely drained by midnight, that his troops easily found their way along its bed; and the gates, which used to shut up the passages from its banks, having been left open in consequence of the general disorder, they encountered no obstacle whatever in their progress. Having thus penetrated into the heart of the city, and met, according to agreement, at the gates of the palace, they easily overpowered the guards, cut to pieces all who opposed them, slew the king Belshazzar while attempting to make resistance, and received the submission of the whole city within a few hours.

At length, in the fifth year of Darius Hystaspes, about 518 years before Christ, they openly raised the standard of rebellion, and thus drew upon themselves the whole force of the Persian empire. Determined upon a desperate defence, and desirous to make their provisions last as long as possible, they adopted the barbarous resolution of destroying all such persons in the city as could be of no service during the siege. Having sacrificed the lives of their friends, and resolutely regardless of their own, they resisted successfully all the strength and stratagems of the Persians for the space of

eighteen months; and fell at length into the hands of Darius, by the following extraordinary instance of fortitude in one of his officers:

Zopyrus, one of the principal noblemen in the Persian court, appeared in the presence of his prince, covered with blood, deprived of his nose and ears, torn with stripes, and wounded in various parts of his body; unfolded to the astonished monarch his design of deserting to the enemy, and arranged his future plan of operations. Approaching the walls of the city, he was carried before the governor, detailed the cruel treatment which he professed to have received from Darius, offered his services to the Babylonians, who were well acquainted with his rank and abilities; acquired their confidence by several successful sallies; obtained at length the chief command of their forces, and thus easily found means to betray the city to his master.

As soon as Darius was in possession of Babylon, he ordered its hundred gates and its impregnable walls to be demolished; put to death 3,000 of those who had been principally concerned in its revolt, and sent 50,000 women from different parts of his empire, to supply the place of those who had been so cruelly destroyed at the commencement of the siege. In the year B. C. 478, Xerxes, the successor of Darius, returning from his inglorious invasion of Greece, passed through the city of Babylon; and partly from hatred of the Sabian worship,

partly with a view to recruit his treasures, plundered the temple of Belus of immense wealth, and then laid its lofty tower in ruins.

In this state it continued till the year B. C. 324, when Alexander the Great made an attempt to rebuild the sacred edifice, and to restore its former magnificence. But, though he employed about 10,000 men in this work for the space of two months, his sudden death put an end to the undertaking before the ground was cleared of its rubbish. This mighty city declined very rapidly under the successors of Alexander; and, in the year 294 B. C., was almost exhausted of its inhabitants by Seleucus Nicator, who built in its neighborhood the city of Seleucia, or New Babylon.

So very slight are the vestiges now to be found of ancient Babylon, that it is difficult to ascertain exactly the spot on which it stood; so completely has been fulfilled the prediction of Isaiah: "Babylon, the glory of kingdoms, the beauty of the Chaldees' excellency, shall be as when God overthrew Sodom and Gomorrah. It shall never be inhabited, neither shall it be dwelt in from generation to generation; neither shall the Arabian pitch tent there; neither shall the shepherds make their fold there. But wild beasts of the desert shall be there, and their houses shall be full of doleful creatures, and owls shall dwell there, and satyrs shall dance there, and the wild beasts of the islands shall cry in their desolate houses,

and dragons in their pleasant places." The striking accomplishment of Scripture prophecies, in the conquest, decline, and desolation of Babylon, is very fully illustrated by Rollin, and other eminent historians.

THE RUINS OF PALMYRA.

This noble city of ancient Syria, also called *Tadmor*, is of uncertain date and origin, but is thought by many to have been the *Tadmor in the wilderness* built by Solomon. Its splendid ruins consist of temples, palaces, and porticoes of Grecian architecture, scattered over an extent of several miles. The most remarkable of them is the Temple of the Sun, the ruins of which are spread over a square of 220 yards. It was encompassed with a stately wall, built of large square stones, and adorned with pilasters within and without, to the number of 62 on each side. Within the court are the remains of two rows of very noble marble pillars 37 feet high, with their capitals of most exquisite workmanship.

Of these 58 only remain entire; but there must have been many more, for they appear to have surrounded the whole court and to have supported a double piazza. The walks on the side of the piazza opposite to the front of the castle, seem to have been the most spacious and beautiful. At the end of this line

are two niches for statues, with their pedestals, borders, supporters, and canopies, carved with the utmost elegance. The space within the enclosure appears to have been an open court, in the centre of which stood the temple, encompassed with another row of pillars of a different order and much taller, being 50 feet in height; of these 16 only remain.

The whole space contained within these pillars is 59 yards in length, and nearly 28 in breadth. The temple, which points north and south, is 33 yards in length, and 13 or 14 in breadth. At its centre, on the west side, is a most magnificent entry, on the remains of which, vines and clusters of grapes are carved in the most bold and masterly imitation of nature that can be conceived. Over the door was displayed a pair of wings extending its whole breadth; but the body to which they belonged is totally destroyed, so that it cannot certainly be known whether it was that of an eagle or of a cherub, several representations of both being visible on other fragments of the building.

Its northern extremity is adorned with the most curious fret-work and bas-relief; and in the centre is a dome or cupola, about 10 feet in diameter, which appears to have been either hewn out of the rock, or moulded of some composition which by time has become equally hard. North of this place is an obelisk, consisting of seven large stones, besides its capital

and the wreathed work about it. It probably supported a statue, which the Turks in their zeal against idolatry have destroyed. At the distance of a quarter of a mile from this pillar, to the east and west, are two others, besides the fragment of a third, so as to lead to the supposition that there was originally a continued row.

About 100 paces from the middle obelisk, straight forward, is a magnificent entry to a piazza, 40 feet in breadth, and more than half a mile in length, enclosed with two rows of marble pillars 26 feet high, and 8 or 9 feet in compass. Of these there still remain 129; and by a moderate computation there could not have been originally less than 560. The upper end of this piazza was shut in by a row of pillars, standing somewhat closer than those on each side. A little to the left are the ruins of a stately building, which appears to have been a banqueting-house: it is built of better marble, and is finished with still greater elegance than the piazza.

The pillars by which it was supported were of one entire stone, so strong that one of them which has fallen down has not received the slightest injury. It measures 23 feet in length, and in compass 8 feet 9 inches. At the west side of the piazza are several apertures for gates into the court of the palace, each of them ornamented with four porphyry pillars, not standing in a line with those of the wall,

but placed by couples in the front of the gate facing the palace, two on each side. Two of these only remain entire, and one only standing in its place. They are 30 feet in length, and 9 in circumference.

On the east side of the piazza stand a great number of marble pillars, some perfect, but the greater part mutilated. In one place 11 of them are ranged in a square, the space they enclose being paved with broad flat stones, but without any remains of a roof. At a little distance are the remains of a small temple, also without a roof, and having its walls much defaced. Before the entry, which faces the south, is a piazza supported by six pillars, two on each side of the door and one at each end. The pedestals of those in front have been filled with inscriptions, both in the Greek and Palmyrene languages, which are become totally illegible.

Among these ruins are many sepulchres, ranged on each side of a hollow way towards the north part of the city, and extending more than a mile. They are square towers, four or five stories high, alike in form, but differing in magnitude and splendor. The outside is of common stone; but the floors and partitions of each story are of marble. A walk crosses the centre of this range of buildings, and the space on each side is subdivided by thick walls, into six partitions, the space between which is wide enough to receive the largest

corpse. In these niches six or seven are piled on one another.

THE RUINS OF BALBEC.

These magnificent ruins are described by Mr. Bruce as even surpassing what he had seen at Palmyra. He was particularly struck by the splendid vestiges of the great temple, supposed to have been dedicated to the sun. The *Castle of Balbec*, or *Tower of Lebanon*, is described by Father Leander, of the order of barefooted Carmelites, in his interesting travels, as a surprising monument of antiquity, built, according to the tradition of the natives, by Solomon. His relation is as follows:

"Balbec is distant from Damascus, towards the north, about fifty miles, and on the southern side is watered by springs and rivulets, brought thither no doubt to fill the ditches by which it was to have been surrounded for defence, but which were not completed. It is situated on the lofty summit of a hill, in approaching which the façade of the castle is seen, having two towers at its right angles, between which is a great portico resembling the mouth of a vast cave, and provided with very strong walls. That on the right hand, by which the portico is attached to the tower from the west to the north, is composed of four stones only;

the fifth, which was to have completed the fabric, being deficient.

"The length of each of these stones is not less than sixty-two feet, and their breadth and height thirteen. They are so artfully brought together, without any cement, that they appear to be only one solid block. The remainder of the wall to the left is of hewn stones, well cemented with quick lime, the smallest of which are 6 feet in length, and 4 feet six inches in height; there are many which are upwards of fifteen feet in length, but the height of all of them is the same.

"Having entered the cavern by the grand portico, the traveller proceeds in obscurity to the distance of eighteen paces, when he at length perceives a ray of light proceeding from the aperture of the door which conducts to the centre. At each of the sides, and within this grand portico, is a flight of stone steps which leads to the subterraneous prisons. Their aspect is horrid, and they are dangerous, inasmuch as they are wont to be frequented by bands of robbers, who here plunder, kill, and bury such wretched travellers as are imprudently led by their curiosity to penetrate and risk the descent without being well escorted.

"Following the road above, by the cavern, to the extent of fifty paces, an ample area of a spherical figure presents itself, surrounded by majestic columns of granite, some of them

of a single piece, and others formed of two pieces, the whole of them of so large a dimension that two men can with difficulty girt them. They are of the Ionic order of architecture, and are placed on bases of the same stone, at such distances from each other that a coach and six might commodiously turn between them. They support a flat tower or roof, which projects a cornice wrought with figures of matchless workmanship: these rise above the capitals with so nice a union, that the eye, however perfect it may be, cannot distinguish the part in which they are joined.

"At the present time, the greater part of this colonnade is destroyed, the western part alone remaining perfect and upright. This fabric has an elevation of 500 feet, and is 400 feet in length. In its exterior, and behind, it is flanked by two other towers similar to those of the first façade, the whole projecting from the wall, which withinside is provided with loop holes to keep off the enemy, in case of necessity, by the means of stones and fire. It also surrounds the colonnade, more particularly in the part which looks toward the east. At the left flank rises a temple which, tradition says, was the hall of audience of Solomon, in height at least 80 feet, and long and large in proportion. Its stones are all sculptured with bas-reliefs, similar to those which ornament Trajan's column at Rome, representing many triumphs and naval engagements.

"Several of these bas-reliefs have been defaced by the Saracens, who are the decided enemies of all sculptures. Withoutside this grand hall is an avenue of the same size and breadth, where the traveller admires a large portal constructed with three stones only, attached to which in the middle part, serving as an architrave, is seen, in a garland of laurel interwoven with flowers, a large eagle, admirably sculptured in bas-relief.

"At the sides of the portal are placed two columns, in one of which, although formed of a single stone, is a winding staircase by which to ascend to the architrave: the passage is, however, very narrow. There is in the vicinity another temple of an octangular shape, with a portico of superb architecture, and having three windows on the side opposite to the former."

On a large stone are inscribed these words in Latin: *Diviso Mosei*, on which Father Leander confesses he knows not what interpretation to bestow. Thrice he returned to visit this splendid vestige of antiquity; and on the last of these occasions, being well escorted, he proceeded to the distance of about a mile, to the foot of the mountains of Damascus, whence the stones employed in its construction were brought. He measured the stone which remained there, and which has been already noticed as having been intended for the fifth in the construction of the wall: it had been

hewn out on all sides, was lying on the ground, and was simply attached to the rock at the inferior part.

Its length and dimensions were such, that he could not conceive how it would have been possible to detach it, and still less with what machines to move, transport, and raise it to the height at which the other stones are placed, more especially as the sites, the roads, and the masses of rock are such, as to exceed in asperity whatever the imagination can picture to itself. In the vicinity of the cave whence these stones were drawn, is a very beautiful sepulchre supported by columns of porphyry, over which is a dome of the finest symmetry.

THE CITY OF JERUSALEM.

This ancient city of Asia has been the scene of occurrences the most interesting to the spiritual welfare of the human race. While the warrior, forgetting it as the place where the God of heaven deigned to commune most intimately with his creatures, and where the founder of our religion displayed most miraculously the powers of that God, with the deepest interest traces upon the page of its history, sieges and battles—victories and defeats, more shocking in their progress and more bloody in their termination, than are found recorded, perhaps, of any other city on the earth.

It was here that David strung his sacred lyre, the strains of which are still echoed from the sanctuaries of the living God. And it was here too that Solomon built that temple, the splendor of which was so much admired in the ancient world. The most remarkable siege it ever underwent, is that when it was taken and destroyed by Titus, 70 years after the death of our Saviour. According to Josephus, 97,000 prisoners fell into the hands of the conqueror, 11,000 perished with hunger, and the whole number slain and taken prisoners during the war, was 1,460,000. It since has been the prey to various conquerors, until about 1150, when it became permanently subject to the Turks, under whose dominion it appears to be in a state of gradual decline.

Dr. Clarke, however, in his recent visit, by no means found it to present that aspect of desolation which some travellers have reported. On obtaining the first view of it in the approach from the north, instead of a wretched and ruined town, he beheld a flourishing and stately metropolis, presenting a magnificent assemblage of domes, towers. palaces, churches, and monasteries; all of which, glittering in the sun's rays, shone with inconceivable splendor. The streets of Jerusalem are cleaner than those of any other city of the Levant; but like all of them, are very narrow. The houses are lofty, and as no windows appear on any of the lower stories, and those above

are latticed, the passage appears to be between blank walls.

The present population is estimated at from 20 to 30,000, consisting of Arabs, Turks, Jews, and Armenians, among which are to be found but about 200 Christian families. The city itself is situated between two hills, named Acre and Moriah. The walls which surround it are said to have a circumference of 4,500 paces. It has seven gates, of which that of Damascus to the north, and that of Ephraim or Bethlehem to the west, are the most romantic and picturesque. The walls of the latter are high, crenated, and provided with square towers from distance to distance. Several of its steep and unpaved streets are without inhabitants; and many spacious houses, together with churches and monasteries, have been entirely abandoned.

THE PYRAMIDS OF EGYPT.

The pyramids of Egypt are well entitled to a place among the most interesting curiosities in the world. The principal ones stand opposite Cairo, on the west side of the river Nile. They are built of stones, which overleap each other, and thus form steps from the bottom to the top. The perpendicular height of the largest is about 500 feet, and the area of its base contains nearly 500,000 square feet, or some-

thing more than eleven English acres of ground. Some idea may be formed of the cost and labor in the construction of this pyramid, from the fact that thirty years were spent in building it, and that 100,000 men were constantly employed on the work.

Such were the famous Egyptian pyramids, which, by their figure as well as size, have triumphed over the injuries of time and the barbarians. But whatever efforts men make, their own nothingness will always appear. These pyramids were tombs; and there is still to be seen, in the middle of the largest, an empty sepulchre cut out of entire stone, about three feet deep and broad, and a little above six feet long. Thus all this bustle, all this expense, and all the labors of so many thousand men, ended in procuring a prince, in this vast and almost boundless pile of buildings, a little vault six feet in length.

Besides, the kings who built these pyramids had it not in their power to be buried in them, and so did not enjoy the sepulchre they had built. The public hatred which they incurred, by reason of their unheard-of cruelties to their subjects in laying such heavy tasks upon them, occasioned their being interred in some obscure place, to prevent their bodies from being exposed to the fury and vengeance of the populace.

This last circumstance, of which historians have taken particular notice, teaches us what

judgment we ought to pass on these edifices, so much boasted of by the ancients. It is but just to remark and esteem the noble genius which the Egyptians had for architecture; a genius that prompted them, from the earliest times, and before they could have any models to imitate, to aim in all things at the grand and magnificent; and to be intent on real beauties, without deviating in the least from a noble simplicity, in which the highest perfection of the art consists.

But what idea ought we to form of those princes, who considered as something grand the raising, by a multitude of hands and by the help of money, immense structures, with the sole view of rendering their names immortal; and who did not scruple to destroy thousands of their subjects to satisfy their vainglory! They differed very much from the Romans, who sought to immortalize themselves by works of a magnificent kind, but, at the same time, of public utility.

Pliny gives us, in a few words, a just idea of these pyramids, when he calls them a foolish and useless ostentation of the wealth of Egyptian kings; and adds, that by a just punishment, their memory is buried in oblivion, historians not agreeing amongst themselves about the names of those who first raised those vain monuments. In a word, according to the judicious remark of Diodorus, the industry of the architects of those pyramids is no less val-

uable and praiseworthy, than the design of the Egyptian kings is contemptible and ridiculous.

But what we should most admire in these ancient monuments, is the true and standing evidence they give of the skill of the Egyptians in astronomy; that is a science which seems incapable of being brought to perfection, but by a long series of years and a great number of observations. It has been found, that the four sides of the great pyramid named, were turned exactly to the four quarters of the world; and consequently showed the true meridian of that place.

Now, as so exact a situation was, in all probability, purposely pitched upon by those who piled up this huge mass of stones above three thousand years ago, it follows, that during so long a space of time, there has been no alteration in the heavens in that respect, or, which amounts to the same thing, in the poles of the earth or the meridians.

THE RUINS OF HERCULANEUM.

This city was, together with Pompeii and Stabia, involved in the common ruin occasioned by the dreadful eruption of Vesuvius, in the reign of Titus, the Roman emperor. It was situated on a point of land stretching into the Gulf of Naples, about two miles distant from that city, near where the modern towns of Por-

tici and Resini, and the royal palace by which they are separated, now stand. The neck of land on which it was built, and which has since disappeared, formed a small harbor.

Hence the appellation of *Herculis Porticum*, the small haven of Hercules, sometimes given to Herculaneum, and thence, in all probability, the modern name of Portici. The latter being situated immediately above some of the excavations of Herculaneum, the just fear of endangering its safety by undermining it, is given as a principal reason why so little progress has been made in the Herculanean researches.

The discovery of Herculaneum is thus explained. At an inconsiderable distance from the royal palace of Portici, and close to the sea-side, Prince Elbeuf, in the beginning of the last century, inhabited an elegant villa. To obtain a supply of water, a well was dug, in the year 1730, through the deep crust of lava, on which the mansion itself had been reared. The laborers, after having completely pierced through the lava, which was of considerable depth, came to a stratum of dry mud.

This event precisely agrees with the tradition relative to Herculaneum, that it was in the first instance overwhelmed by a stratum of hot mud, which was immediately followed by a wide stream of lava. Whether this mud was thrown up from Vesuvius, or formed by torrents of rain, does not appear to have been decided. Within the stratum, the workmen

found three female statues, which were sent to Vienna.

It was not until some years after, that the researches at Herculaneum were seriously and systematically pursued. By continuing Elbeuf's well, the excavators at once came to the theatre, and from that spot carried on their further subterraneous investigation. The condition of Herculaneum was at that time much more interesting, and more worthy the notice of the traveller, than it is at present.

The object of its excavation having unfortunately been confined to the discovery of statues, paintings, and other curiosities, and not carried on with a view to lay open the city, and thus to ascertain the features of its buildings and streets, most of the latter were again filled up with rubbish as soon as they were divested of every thing moveable. The marble was even torn from the walls of the temples. Herculaneum may therefore be said to have been overwhelmed a second time by its modern discoverers; and the appearance it previously presented, can now only be ascertained from the accounts of those who saw it in a more perfect state. Agreeably to them, it must at that time have afforded a most interesting spectacle.

The theatre was one of the most perfect specimens of ancient architecture. It had, from the floor upward, eighteen rows of seats, and above these, three other rows, which be-

ing covered with a portico seem to have been intended for the female part of the audience, to screen them from the rays of the sun. It was capable of containing between three and four thousand persons. Nearly the whole of its surface was, as well as the arched walls which led to the seats, cased with marble.

The area, or pit, was floored with thick squares of *giallo antico*, a beautiful marble of a yellowish hue. On the top stood a group of four bronze horses drawing a car with a charioteer, all of exquisite workmanship. The pedestal of white marble is still to be seen in its place ; but the group itself had been crushed and broken in pieces by the immense weight of lava which fell on it. The fragments having been collected, might easily have been brought together again, but having been carelessly thrown into a corner, a part of them were stolen, and another portion fused and converted into busts of their Neapolitan majesties.

At length it was resolved to make the best use of what remained, that is, to convert the four horses into one, by taking a fore leg of one of them, a hinder leg of another, the head of a third, &c. ; and where the breach was irremediable, to cast a new piece. To this contrivance the bronze horse in the court-yard of the Museum of Portici owes its existence ; and, considering its patch-work origin, still conveys a high idea of the skill of the ancient artist.

In the forum, which was contiguous to the theatre, besides a number of inscriptions, columns, &c., two beautiful equestrian statues of the Balbi family were found. These are of white marble, and are deposited in the hall of the left wing of the palace at Portici.

The most important discovery, however, was that of a villa at a small distance from the forum; not only on account of the peculiarity of its plan, but because the greater number of the works of art were dug out of its precinct; and more especially because it contained a library consisting of more than fifteen hundred volumes, which are likewise safely deposited in the museum, and which, were they legible, would form a great classic treasure.

The villa is conjectured to have belonged to one of the Balbi family. Although elegant, it was small, and consisted of a ground-floor only, like those of Pompeii. Besides a number of small closets round an interior hall, it contained a bathing-room, curiously fitted up with marble and water-pipes, and a chapel of a diminutive size, without any window or aperture for daylight, the walls of which were painted with serpents, and within which a bronze tripod, filled with cinders and ashes, was found standing on the floor.

The apartment which contained the library was fitted up with wooden presses around the walls, about six feet in height: a double row

of presses stood insulated in the middle of the room, so as to admit a free passage on every side. The wood of which the presses had been made was burned to a cinder, and gave way at the first touch; but the volumes, composed of a much more perishable substance, the Egyptian or Syracusan papyrus, were, although completely carbonized through the effect of the heat, still so far preserved as to admit of their removal to a similar set of modern presses, provided however with glass doors, in the museum.

In the middle of the garden belonging to this villa, was a basin nearly of the size and form of the one in the Green Park, having its edges faced with stone, and the two narrow ends rounded off in a semicircular form. This piece of water was surrounded by beds or parterres of various shapes; and the garden was on every side enclosed by a covered walk supported by columns.

Of these columns there were sixty-four, ten for each of the shorter, and twenty-two for each of the longer sides of the quadrangle: they were made of brick, neatly stuccoed over, exactly similar to those in the Pompeian barracks. Each pillar supported one end of a wooden beam, the other extremity of which rested on the garden wall, thus forming an arbor, probably planted with vines, around the whole garden. Under this covered walk, several semicircular recesses, which appear

to have served as bathing places, were built. The spaces between the pillars were decorated with marble busts and bronze statues, alternately arranged.

This garden was surrounded by a narrow ditch; and another covered walk, of a considerable length, led to a circular balcony or platform, the ascent to which was by four steps, but which overhung the sea about fifteen feet. The floor of the balcony consisted of the very beautiful tesselated pavement, which now serves as the floor of one of the rooms of the Portici museum. From this charming spot, the prospect over the whole Bay of Naples, including the mountains of Sorento, the Island of Capri, and Mount Pausilippo, must have been delightful.

RUINS OF POMPEII.

A CITY bearing the above name, in Campania, formerly celebrated for its commerce, was partly destroyed by an earthquake, A. D. 63, and, together with Herculaneum, was buried by a stream of lava, or rather a shower of ashes, A. D. 79, and was first discovered in 1748. It lies about twelve miles southeast from Naples. Pompeii is said to have been founded by Opici, and, at a later period, was in possession of the Samnites, who, having revolted, were replaced by Roman colonists.

Pompeii is a less considerable city than Herculaneum, yet it contained many fine works of art, a large theatre, and many handsome buildings. The bed of ashes that covered it was about eighteen feet in depth. Although two thirds are still covered, it is estimated that the town was three quarters of a mile in length by nearly half a mile in breadth. The walls are from eighteen to twenty feet high, and twelve thick, and contained several main gates, of which six have been uncovered. Twenty streets, fifteen feet wide, paved with lava, and having foot-ways of three feet broad, have also been excavated.

The tracks of the wheels which anciently rolled over the pavement are still visible. An elevated path runs by the sides of the houses, for foot-passengers; and, to enable them in rainy weather to pass more commodiously to the opposite side, large flat stones, three of which take up the width of the road, were laid at a distance from each other. As the carriages, in order to avoid these stones, were obliged to use the intermediate spaces, the tracks of the wheels are there most visible. The whole of the pavement is in good condition; it consists merely of considerable pieces of lava, which, however, are not cut, as at the present, into squares, and may have been on that account the more durable.

The part which was first cleared, is supposed to have been the main street of Pompeii;

but this is much to be doubted, as the houses on both sides, with the exception of a few, were evidently the habitations of common citizens, and were small and provided with booths. The street itself likewise is narrow; two carriages only could go abreast; and it is very uncertain whether it ran through the whole of the town; for, from the spot where the moderns discontinued digging, to that where they recommenced, and where the same street is supposed to have been again found, a wide tract is covered with vineyards, which may very well occupy the places of the most splendid streets and markets, still concealed underneath.

Among the objects which attract particular attention, is a booth in which liquors were sold, and the marble table within which bears the marks of the cups left by the drinkers. Next to this is a house, the threshold of which is inlaid by a salutation of black stone, as a token of hospitality. On entering the habitations, the visiter is struck by the strangeness of their construction. The middle of the house forms a square, something like the cross passages of a cloister, often surrounded by pillars: it is cleanly, and paved with parti-colored mosaic, which has an agreeable effect.

In the middle is a cooling well; and on each side a little chamber, about ten or twelve feet square, but lofty, and painted with a fine red or yellow. The floor is of mosaic; and the

door is made generally to serve as a window, there being but one apartment which receives light through a thick blue glass. Many of these rooms are supposed to have been bed-chambers, because there is an elevated broad step, on which the bed may have stood, and because some of the pictures appear most appropriate to a sleeping-room.

Others are supposed to have been dressing-rooms, on this account, that on the walls a Venus is described decorated by the Graces, added to which little flasks and boxes of various descriptions have been found in them. The larger of these apartments served for dining-rooms, and in some are found suitable accommodations for cold and hot baths.

Most of the houses consist of one such square surrounded by rooms. In a few some decayed steps seem to have led to an upper story, which is no longer in existence. Some habitations, however, probably belonging to the richer and more fashionable, are far more spacious. In these a first court is often connected with a second, and even with a third, by passages; in other respects their arrangements are pretty similar to those above described. Many garlands of flowers and vine branches, and many handsome pictures, are still to be seen on the walls.

One of the houses belonged to a statuary, whose work-shop is still full of the vestiges of his art. Another appears to have been in-

habited by a surgeon, whose profession is equally evident from the instruments discovered in his chamber. A large country house near the gate undoubtedly belonged to a very wealthy man, and would, in fact, still invite inhabitants within its walls. It is very extensive, stands against a hill, and has many stories. Its finely decorated rooms are unusually spacious; and it has airy terraces, from which you look down into a pretty garden, that has been now again planted with flowers.

In the middle of this garden is a large fish-pond, and near that an ascent from which, on two sides, six pillars descend. The hinder pillars are the highest, the middle somewhat lower, and the front the lowest; they appear, therefore, rather to have propped a sloping roof, than to have been destined for an arbor. A covered passage, resting on pillars, encloses the garden on three sides; it was painted, and probably served in rainy weather as an agreeable walk. Beneath is a fine arched cellar, which receives air and light by several openings from without; consequently its atmosphere is so pure, that in the hottest part of summer it is always refreshing.

A number of large wine-vessels are to be seen here, still leaning against the wall, as the butler left them when he carried up the last goblet of wine for his master. Had the inhabitants of Pompeii preserved these vessels with stoppers, wine might still have been found

in them; but as it was, the stream of ashes running in, of course forced out the wine. More than twenty human skeletons of fugitives, who thought to save themselves here under ground, but who experienced a tenfold more cruel death than those suffered who were in the open air, were found in this cellar.

The destiny of the Pompeians must have been dreadful. It was not a stream of fire that encompassed their abodes; they could then have sought refuge in flight. Neither did an earthquake swallow them up; sudden suffocation would then have spared them the pangs of a lingering death. A rain of ashes buried them alive by degrees. We will read the delineation of Pliny:—"A darkness suddenly overspread the country; not like the darkness of a moonless night; but like that of a closed room, in which the light is of a sudden extinguished. Women screamed, children moaned, men cried. Here, children were anxiously calling their parents; and there, parents were seeking their children, or husbands their wives; all recognised each other only by their cries. The former lamented their own fate, and the latter that of those dearest to them. Many wished for death, from the fear of dying. Many called on the gods for assistance; others despaired of the assistance of the gods, and thought this the last eternal night of the world. Actual dangers were magnified by unreal terrors. The earth continued to shake, and men, half

distracted, to reel about, exaggerating their own fears, and those of others, by terrifying predictions."

Before the above-mentioned country house was still a male skeleton, standing with a dish in his hand; and, as he wore on his finger one of those rings which were allowed to be worn by Roman knights only, he is supposed to have been the master of the house, who had just opened the back garden gate with the intent of flying, when the shower overwhelmed him. Several skeletons were found in the very posture in which they had breathed their last, without having been forced by the agonies of death to drop the things they had in their hands. This leads to a conjecture, that the thick mass of ashes must have come down all at once, in such immense quantities as instantly to cover them. It cannot otherwise be imagined how the fugitives could all have been fixed, as it were by a charm, in their position; and in this manner their destiny was the less dreadful, seeing that death suddenly converted them into motionless statues, and thus was stripped of all the horrors with which the fears of the sufferers had clothed him in imagination. But what then must have been the pitiable condition of those who had taken refuge in the buildings and cellars? Buried in the thickest darkness, they were secluded from every thing but lingering torment; and who can paint to himself without shuddering, a slow dissolution ap-

proaching, amid all the agonies of body and of mind? The soul recoils from the contemplation of such images.

Two theatres, the smaller one particularly, are in an excellent state of preservation. The structure of this one is such as was usually adopted by the ancients, and is well deserving of modern imitation, as it affords the spectators commodious seats, a free view of the stage, and facility of hearing. Although sufficiently large to contain two thousand persons, the plebeians, standing in a broad gallery at the top, were quite as able to see all that was passing on the stage as the magistrate in his marble balcony.

In this gallery the arrangements for spreading the sailcloth over the spectators are still visible. The stage itself is very broad, as it has no side walls; and appears less deep than it really is. A wall runs across it, and cuts off just as much room as is necessary for the accommodation of the performers. But this wall has three very broad doors; the middle one is distinguished by its height, and the space behind it is still deeper than in front. If these doors, as may be conjectured, always stood open, the stage was in fact large, and afforded, besides, the advantage of being able to display a double scenery: if, for example, the scene in front was that of a street, there might have been behind a free prospect into the open field.

The smaller of the theatres is to the right, and

is called the covered theatre, because it was so constructed, that, by the means of canvass awnings, the spectators were defended from the sun and rain. A door through the wall leads to the different galleries, and to the open space in the centre, resembling the pit of a modern theatre. The interior is beautifully neat; and, with the exception of the spoliation of the marble slabs, removed to the palace at Portici, with which the whole of the inside, not excepting the seats, had been covered, in excellent preservation. On each side are the seats for the magistrates; the orchestra, as in modern theatres, is in front of the stage; and the latter, with its brick wings, is very shallow. This theatre was calculated to contain about two thousand spectators.

From its level a staircase leads to an eminence on which several public buildings are situated. The most conspicuous of these is a small temple said to have been dedicated to Isis, and having a secret passage, perforated in two places, whence the priests are supposed to have delivered to the deluded multitude the oracles of that deity.

Within a paved court is an altar of a round shape, on the one side, and on the other side a well. A cistern, with four apertures, was placed at a small distance, to facilitate the procuring of water. In this court, sacrifices, and other holy rites are conjectured to have taken place, various utensils for sacrifice, such

as lamps, tripods, &c., having been found when the place was first excavated. One of the tripods is of the most admirable workmanship.

On each of the three legs, a beautiful sphinx, with an unusual headdress, is placed, probably in allusion to the hidden meanings of the oracles which were delivered in the above-mentioned temple. The hoop in which the basin for the coals was sunk, is elegantly decorated with rams' heads connected by garlands of flowers; and within the basin, which is of baked earth, the very cinders left from the last sacrifice, (nearly two thousand years ago,) are seen as fresh as if they had been the remains of yesterday's fire!

From the above court, you enter on a somewhat larger, with a stone pulpit in the centre, and stone seats near the walls. The spot, therefore, was either the auditory of a philosopher, or the place where the public orators pleaded in the presence of the people. Every thing here is in the highest order and preservation.

The great amphitheatre proudly rears its walls over every other edifice on the same elevated spot. It is a stupendous structure, and has twenty-four rows of seats, the circumference of the lowest of which is about 750 feet. It is estimated to have contained about 30,000 spectators. The upper walls are much injured, having partially projected above ground long before the discovery of Pompeii.

A corn-field leads to the excavated upper end of the high street, which consists of a narrow road for carts, with foot pavements on each side. The middle is paved with large blocks of marble, and the ruts of the wheels proclaim its antiquity, even at the time of its being overwhelmed. The foot-paths are elevated about a foot and a half from the level of the carriage road. The houses on each side, whether shops or private buildings, have not any claim to external elegance; they consist of a ground-floor only, and, with the exception of the door, have not any opening towards the street.

The windows of the private houses look into an inner square court, and are in general very high. The apartments themselves are, with the exception of one in each house, which probably served as a drawing-room, both low and diminutive. In point of decoration they are neat, and, in many instances, elegant; the floors generally consist of figured pavements, either in large stones of various colors, regularly cut and systematically disposed, or are formed of beautiful mosaic, with a fanciful border, and an animal or figure in the centre.

The walls of the apartments are equally; if not still more deserving attention. They are painted, either in compartments, exhibiting some mythological or historical event, or simply colored over with a light ground, adorned with a border and perhaps an elegant little vignette, in the centre or at equal distances. But few

of the historical paintings now exist in Pompeii; for wherever a wall was found to contain a tolerable picture, it was removed and deposited in the museum at Portici. To effect this, the greatest care and ingenuity were required, so as to peel off, by the means of sawing pieces of wall, twenty and more square feet in extent, without destroying the picture. This, however, was not a modern invention; for, among the excavated remains of Stabiæ, the workmen came to an apartment containing paintings which had been separated by the ancients themselves from a wall, with the obvious intent of their being introduced in another place. This was, however, prevented by the ruin of the city; and the paintings, therefore, were found leaning against the wall of the apartment.

POMPEY'S PILLAR.

The pillar of Pompey, as it is generally called, is situated about a quarter of a league from the southern gate at Alexandria in Egypt. It is composed of red granite. The capital is Corinthian, ornamented with palm-leaves, and not indented. The shaft and the upper member of the base are of one piece, ninety feet long, and nine in diameter. The base, which is a square block of marble, sixty feet in circumference, rests on two layers of stone, bound

together with lead. The whole column is 114 feet high, perfectly well polished, and only a little shivered on the eastern side.

Nothing can equal the majesty of this monument; seen from a distance, it overtops the town, and serves as a signal for vessels; and on a nearer approach, it produces astonishment mingled with awe. One can never be tired with admiring the beauty of the capital, the length of the shaft, and the extraordinary simplicity of the pedestal; although the latter has been rather damaged by the instruments of travellers, who were anxious to possess a relic of this antiquity: and one of the volutes of the column was immaturely brought down, in the year 1781, by a prank of some English captains, which is thus related by Mr. Irwin.

These jolly tars of Neptune had been pushing about one of the ships in the harbor, until a strange freak entered into one of their brains. The eccentricity of the thought occasioned it immediately to be adopted, and its apparent impossibility was but a spur for putting it into execution. The boat was ordered, and with proper implements for the attempt these enterprising heroes pushed ashore, to drink a bowl of punch on the top of Pompey's pillar! At the spot they arrived, and many contrivances were proposed to accomplish the desired point. But their labor was vain, and they began to despair of success, when the genius who struck out the frolic happily suggested the means of

performing it. A man was dispatched to the city for a paper kite.

The inhabitants were by this time apprized of what was going forward, and flocked in crowds to be witnesses of the address and boldness of the English. The governor of Alexandria was told that these seamen were about to pull down Pompey's pillar. But whether he gave them credit for their respect to the Roman warrior, or to the Turkish government, he left them to themselves and politely answered—that the English were too great patriots to injure the remains of Pompey. He knew little, however, of the disposition of the people who were engaged in this undertaking; for had the Turkish empire risen in opposition, it would not perhaps at that moment have deterred them.

The kite was brought, and flown so directly over the pillar, that when it fell on the other side, the string lodged upon the capital. The chief obstacle was now overcome. A two inch rope was tied to one end of the string, and drawn over the pillar by the end to which the kite was affixed. By this rope one of the seamen ascended to the top; and, in less than an hour, a kind of shroud was constructed, by which the whole company went up and drank their punch, amid the shouts of the astonished multitude. To the eye below, the capital of the pillar does not appear capable of holding more than one man upon it; but our seamen

found it could contain no less than eight persons very conveniently.

It is astonishing that no accident befell these madcaps, in a situation so elevated that it would have turned a landman giddy in his sober senses. The only detriment which the pillar received was the loss of the volute before mentioned, which came down with a thundering sound, and was carried to England by one of the captains, as a present to a lady who commissioned him for a piece of the pillar. The discovery which they made amply compensated for this mischief, as, without their evidence, the world would not have known at this hour, that there was originally a statue on this pillar, one foot and an ankle of which are still remaining. The statue must have been of a gigantic size, to have appeared of a man's proportion at so great a height.

There are circumstances in this story which might give it an air of fiction, were it not demonstrated beyond all doubt. Besides the testimonies of many eye-witnesses, the adventurers themselves have left a token of the fact by the initials of their names, which are very legible in black paint just beneath the capital.

Learned men and travellers have made many fruitless attempts to discover in honor of what prince this stately pillar was erected; for, notwithstanding its common appellation, it could not have been raised to the memory of Pompey, as neither Strabo nor Diodorus Siculus

has spoken of it. Abulfeda, in his Description of Egypt, calls it the pillar of Severus; and history informs us, that this emperor visited the city of Alexandria; that he granted a senate to its inhabitants, who, until that time, under the subjection of a single Roman magistrate, had lived without any national council; and that he changed several laws in their favor.

This column, therefore, M. Savary concludes to have been erected by the inhabitants as a mark of their gratitude to Severus. And in a Greek inscription, now half effaced, but visible on the west side when the sun shines upon it, he supposes the name of Severus to have been preserved. He further observes, that this was not the only monument erected to that emperor by the gratitude of the Alexandrians; for there is still in the midst of the ruins of Antinoe a magnificent pillar, the inscription of which is still remaining, and proves that it was dedicated to Alexander Severus. It has, however, been lately asserted that the abovementioned inscription on what is vulgarly called Pompey's pillar has been deciphered, and proves that the column was erected in honor of Diocletian by the then prefect of Egypt.

THE COLISEUM OF ROME.

On approaching the majestic ruins of this vast amphitheatre, the most stupendous work of the kind antiquity can boast, a sweet and gently-moving astonishment is the first sensation which seizes the beholder; and soon afterwards the grand spectacle swims before him like a cloud. To give an adequate idea of this sublime building, is a task to which the pen is unequal: it must be seen to be duly appreciated. It is upwards of 1600 feet in circumference, and of such an elevation, that it has been justly observed by a writer, Ammianus, "the human eye scarcely measures its height."

Nearly the one-half of the external circuit still remains, consisting of four tiers of arcades, adorned with columns of four orders, the Doric, Ionian, Corinthian, and Composite. Its extent may, as well as its elevation, be estimated by the number of spectators it contained, amounting, according to some accounts, to eighty thousand, and agreeably to others, to one hundred thousand.

Thirty thousand captive Jews are said to have been engaged by Vespasian, whose name it occasionally bears, in the construction of this vast edifice; and they have not discredited their forefathers, the builders of Solomon's temple, by the performance. It was not finished, however, until the reign of his son Titus,

who, on the first day of its being opened, introduced into the arena not less than 5,000, or, according to Dio Cassius, 9,000 wild beasts, between whom and the primitive Christians held captive by the Romans battles were fought.

At the conclusion of this cruel spectacle, the whole place was put under water, and two fleets, named the Corcyrian and the Corinthian, represented a naval engagement. To render the vapor from such a multitude of persons less noxious, sweet-scented water, and frequently wine mixed with saffron, was showered down from a grated work above on the heads of the spectators.

The Roman emperors who succeeded Titus were careful of the preservation of this superb edifice; even the voluptuous Heliogabalus caused it to be repaired after a great fire. The rude Goths, who sacked the city of Rome, were contented with despoiling it of its internal ornaments, but respected the structure itself. The Christians, however, through an excess of zeal, have not been satisfied with allowing it gradually to decay. Pope Paul II. had as much of it levelled as was necessary to furnish materials for building the palace of St. Mark, and his pernicious example was imitated by Cardinal Riario, in the construction of what is now called the chancery. Lastly, a portion of it was employed by Pope Paul III. in the erection of the palace Farnese.

Notwithstanding all these dilapidations, there still exists enough of it to inspire the spectator with awe. Immense masses appear fastened to and upon one another without any mortar or cement; and these alone, from their structure, are calculated for a duration of many thousands of years. Occasionally, where the destroyers have not effectually attained their object, the half-loosened masses appear to be holden in the air by some invisible power; for the wide interstices among them leave no other support than their joints, which seem every moment as if about to yield unavoidably to the superior force of gravitation. "They will fall," "they must fall," "they are falling," is, and has been, the language of all beholders during the vast periods through which this stupendous edifice has thus hung together in the air.

AQUEDUCTS.

An aqueduct is an artificial channel, made for conveying water from one place to another, without employing any other principle of mechanics than this, that a body will descend along an inclined plane, or from a higher to a lower level. Hence it is almost unnecessary to observe, that an aqueduct must have a continued slope from its source to the place for which the water is destined.

If there is not a sufficient natural collection of water at the source, the supply must be increased by artificial cuts or drains; and the stream may also be augmented in its course from contiguous springs, by means of cuts branching out from points in the side of the aqueduct. It may sometimes be expedient, too, to conduct it in a circuitous direction, in order to obtain more abundant collections of water, either from springs or artificial excavations, than would be procured by conducting it in a more direct course.

To receive such supplies in the most effectual manner, the channel should be left without any building. In that state, however, it is liable to be worn by the action of the current, the course of which is at last obstructed by accumulations of sand and mud in particular places; though frequency of necessary repairs, in such cases, may be diminished by making, at intervals, large pits, in which the sand and mud may deposite themselves.

If the collection at the source is so great as to render all further supplies unnecessary, the channel should then be well built of stone or brick; and if it is also wished to be free from rain-water, which after having fallen would run into the channel, frequently in a muddy state, the aqueduct must be covered above. If it is necessary to cross a valley, the valley must be built up. The building for this purpose will answer best in the form of an arch,

or a succession of arches, and indeed in most cases it is absolutely necessary to construct it in that manner, particularly when the valley has a river running through it. It is chiefly in the construction of the arches that the ancient aqueducts excite our astonishment. When the valley is deep, several rows of arches may be made one above another.

When it is necessary to pass a mountain, the aqueduct may either be carried round it, or through it by a perforation. In such cases, it is easy to see that the construction of aqueducts must be attended with enormous expense; and in modern times, instead of allowing the water to flow in an open channel, it is found more economical to employ the hydraulic principle; that however the channel may rise or fall, water will continue to run in it, provided it be enclosed on all sides, and nowhere carried higher than the source.

The Romans were either ignorant of this principle, or thought that pipes would not afford a sufficient supply of water for all the purposes they had in view. The quantity of this necessary article of life for the table, as well as for baths and fish-ponds, gave rise to aqueducts of astonishing grandeur and magnificence, to which even emperors were proud to attach their names. Three of these still exist, and supply with water the inhabitants of modern Rome.

The remains of Roman aqueducts may be

traced in other parts of the world; one of the most splendid of these, is that of Segovia in Spain, of which 159 arches, joined without mortar, still remain to attest its ancient grandeur. The most considerable aqueduct of modern times, is that which was built near Maintenon by Louis XIV. for conveying to Versailles the waters of the river Eure. Its length 7000 fathoms, its height 2560, and the number of its arches 242, arranged in three stories.

THE APPIAN WAY.

This was an ancient highway from Rome through Capua to Brundusium, between 330 and 350 miles long. Appius Claudius and Cæcus the Censor, A. U. C. 441, carried it from the Porta Capena to Capua; Julius Cæsar from Capua to Benevento; and Augustus thence to Brundusium. It was laid with hard stone brought from a great distance, large, and squared so exactly as to need no cement; and it was sufficiently wide for several wagons to go abreast. Statius calls it the queen of roads. Its course is described by Horace, Strabo, and Antonine. Caius Gracchus placed stones along it, called cippi and termini, to mark the miles, afford foot passengers resting seats, and enable equestrian tra-

vellers to mount, there being no stirrups used. Great part of this road still remains entire.

THE CHINESE WALL.

This stupendous wall, which extends across the northern boundary of the Chinese empire, is deservedly ranked among the grandest labors of art. It is conducted over the summits of high mountains, several of which have an elevation of not less than 5225 feet, (nearly a mile,) across deep valleys, and over wide rivers, by means of arches; in many parts it is doubled or trebled, to command important passes; and at the distance of nearly every hundred yards is a tower or massive bastion. Its extent is computed at 1500 miles; but in some parts, where less danger is apprehended, it is not equally strong or complete, and towards the northwest consists merely of a strong rampart of earth.

Near Koopekoo it is twenty-five feet in height, and the top about fifteen feet thick; some of the towers, which are square, are forty-eight feet high, and about forty feet in width. The stone employed in the foundation, angles, &c. is a strong gray granite; but the materials for the greater part consist of bluish bricks, and the mortar is remarkably pure and white.

The mass of matter in this stupendous fabric is so enormous, that, according to the calcula-

tion of Mr. Barrow, supposing the dimensions throughout to be nearly the same as where it was crossed by the British embassy, the materials of all the dwelling-houses in Great Britain are scarcely equivalent to it, in solid content. The same writer observes, that the whole of the masonry and brick-work in London does not exceed the quantity contained in the massy towers of brick and stone, exclusive of the wall itself. The foundation consists of large square stones laid in mortar; and the top is paved with flat stones, and is of such breadth in many places, that six horsemen can ride abreast upon it.

The era of the construction of this great barrier, which has been and will continue to be the wonder and admiration of ages, is considered by Sir George Staunton as having been absolutely ascertained; and he asserts that it has existed for two thousand years. In this assertion he appears to have followed Du Halde, who informs us that "this prodigious work was constructed two hundred and fifteen years before the birth of Christ, by order of the first emperor of the family of Tsin, to protect three large provinces from the irruptions of the Tartars."

However, in the history of China, contained in his first volume, he ascribes this erection to the second emperor of the dynasty of Tsin, named Chi Hoang Ti; and the date immediately preceding the narrative of this construc-

tion is the year 137 before the birth of Christ. Hence suspicions may arise, not only concerning the epoch when this work was undertaken, but also relatively to the purity and precision of the Chinese annals in general. Mr. Bell, who resided some time in China, and whose travels are deservedly esteemed for the accuracy of their information, assures us that this wall was built about the year 1160, by one of the emperors, to prevent the frequent incursions of the Monguls, whose numerous cavalry used to ravage the provinces, and effect their escape before an army could be assembled to oppose them.

Renaudot observes that this wall is not mentioned by any oriental geographer whose writings boast a higher antiquity than three hundred years; and it is surprising that it should have escaped Marco Paulo, who, admitting that he entered China by a different route, can hardly be supposed, during his long residence in the north of China, and in the country of the Monguls, to have remained ignorant of so stupendous a work. Amid these difficulties, it may be reasonably conjectured, that similar modes of defence had been adopted in different ages; and that the ancient rude barrier, having fallen into decay, was replaced, perhaps after the invasion of Singis, by the present erection, which, even from its state of preservation, can scarcely aspire to a very remote antiquity.

BALLOONS.

No discovery has ever been made, which drew after it a more general admiration, or excited more extravagant hopes of utility to man, than that of aërostation. It was no sooner announced, than already in the imagination of many, countries were connected, and commercial intercourse maintained, with unheard-of advantages, while philosophy was to receive vast treasures of new facts to extend her borders. How few of these great expectations, after a lapse of more than thirty years, have been realized; and how little has been added to the real knowledge or convenience of life, will be discovered from a review of the most interesting facts that the various voyages which have been performed have brought to light. Let it, at the same time, be duly observed, that the art is still in its infancy, and that the intimate, though not always soon discovered, connection between one fact or one branch of knowledge and another, equally forbids us to consider in vain the exertions already made, or those which may yet be required, before any decisive advantages are derived from aërostation.

Of the various circumstances observed by aëronauts during their voyages, when the apprehension of their safety has ceased, none impresses them so strongly as the stillness that

reigns around ; with some few exceptions they hear no wind, whatever may be its violence, nor perceive their motion, whatever may be its rapidity. To account for this, it must be considered that the air is, with respect to them, at rest, for they move at the same rate with it. It is also remarkable that they never experience any sickness or giddiness. In one instance, the aëronaut, after his descent, was affected with a temporary deafness, but the wet and cold which he had experienced, would probably have had the same effect upon him in a terrestrial journey. Difficulty of respiration has ever been an object of notice.

Of all methods of travelling, that in a balloon appears to people in general to be the most unsafe ; but this is a conclusion drawn from a cursory view of the subject ; the accidents which have happened, particularly those which have terminated fatally, are extremely few in number, and may be attributed to the want of precautions which are easily observed: we have seen even that a rent of 50 feet long, in a Montgolfier, produced no disaster. It should also not be omitted, that voyages have been performed in all weathers, and at all seasons of the year, and that lightning, which had been dreaded as a potent enemy, has never interposed : upon the whole, it appears probable, that a voyage in a balloon is not more likely to endanger the personal safety of an individual, than a voyage from England to Ireland on the sea.

The longest aëronautic excursion ever taken was by Blanchard and Chevalier de l'Epinard, from Lisle; they traversed a distance of 300 miles. The greatest height ever attained in this way, appears to have been by Morreau and Bertrand, who, from Dijon, ascended to the height of 13,000 feet.

The ascending power of a balloon is equal to the weight by which it is lighter than an equal bulk of common air. Every cubic foot of inflammable air may be considered equal to $3\frac{1}{6}$ drachms avoirdupois, which is about one-sixth of the weight of common air. Hence, if the capacity of a balloon be such that it contains 12,000 cubical feet of this gas, its ascending power may be estimated at 12,000 ounces; and therefore the aëronaut, with the boat, and all other appendages, must weigh less than this. An inflammable air-balloon, if twenty feet in diameter, will just suffice for a single person.

In a rarefied air-balloon, or Montgolfier, the air cannot be expected to be above one-third lighter than common air; and a machine of this sort must therefore be in that proportion larger than the other, to have an equal ascending power.

To witness the flight of a large balloon, has an effect upon the mind as difficult to describe as it is impossible not to feel. So spacious a globe, with the magnificence of the decorations, excites admiration; the apparently precarious situation of the adventurers, raises apprehen-

sion; a machine of such extraordinary dimensions, majestically making its way through a medium which is incapable of supporting a feather; impressions from all these sources combine to form a mingled sentiment of the deepest interest, unlike that produced by any other exhibition of art. Many have not been able to bear the spectacle without shedding tears, others have involuntarily lifted their suppliant hands to heaven, or fallen upon their knees; several have fainted, and at Lunardi's first ascent, a delicate female was so overcome by her feelings that she died upon the spot.

THE TOWER OF LONDON.

Of the several fortresses in Great Britain, the most remarkable is the Tower of London, situated on the east side of that city, near the bank of the Thames. It was anciently a royal palace, and consisted of no more than what is now called the White Tower, which appears to have been first marked out by William the Conqueror, in the year 1076, and completed by his son William Rufus, who, in 1098, surrounded it with walls, and a broad deep ditch. Several succeeding princes made additions to it, and king Edward III. built the church. In the year 1638 the White Tower was rebuilt; and since the restoration of king Charles II. it has

been thoroughly repaired, and a great number of additional buildings made to it.

At present, besides the White Tower, here are the offices of ordnance, of the mint, of the keepers of the records, the jewel office, the Spanish armory, the horse armory, the new or small armory, barracks for the soldiers, and several handsome houses; so that the Tower of London has at present more the appearance of a town than a fortress. Upon the wharf is a line of about sixty pieces of cannon, which are fired upon state holydays. On this side of the Tower the ditch is narrow, and over it is a draw-bridge; under the tower-wall, on the same side, is a water-gate, commonly called Traitor's Gate, because it had been customary to convey traitors and other state prisoners through it by water, to and from the Tower.

Parallel to the wharf, upon the walls, is a platform seventy yards in length, called the Ladies' Line, whence there is a fine prospect of the shipping, and the river Thames. From this line there is a walk round the Tower walls, on which are three batteries distinguished by the names of the Devil's Battery, the Stone Battery, and the Wooden Battery, each of which is mounted with several pieces of brass cannon.

The principal entrance to the Tower is by two gates, one within the other, on the west side, both large enough to admit carriages, and

parted by a strong stone bridge, built over the ditch.

The principal officers of the Tower are a constable, a lieutenant, and a deputy-lieutenant.

Within the outer gate is the Lion Tower, in which is a fine collection of wild beasts, consisting of lions and lionesses, leopards, tigers, apes, jackals, and other wild animals, together with a great variety of birds: these animals are all regularly fed, and carefully attended.

In the first story of the White Tower is an armory for the sea-service, containing various sorts of arms, curiously laid up, for above ten thousand seamen; and the upper stories are filled with arms and other warlike instruments, as spades, shovels, pickaxes, and chevaux-de-frise.

Near the southwest angle of the White Tower is the Spanish armory, being the depository of the spoils of the Spanish armada, fitted out by Philip II. of Spain, to invade England in the reign of Queen Elizabeth. It consisted of 132 ships, of which scarcely 70 returned home; and of 30,000 troops on board, of which 20,000 were either killed, drowned, or made prisoners in England. The trophies preserved here of this memorable victory are as follows:—A Spanish battle-axe, with a pistol in the handle and a match-lock; the Spanish general's halberd, covered with velvet, the nails are double gilt, and on the top is the

pope's head curiously engraven. An engine called the Spanish morning-star, from its figure, which is that of a star. Of this kind of engine there were many thousands on board, all with poisoned points, designed to strike at the English in case they ventured to board the Spanish fleet. Thumb-screws, of which there were several chests full on board, intended to extort a confession from the English where their money was hid. A Spanish poll-axe, used in boarding of ships. Spanish halberds, or spears, some of which are curiously engraved, and inlaid with gold. Spanish spaders, or long-swords, poisoned at the points. Spanish cravats, consisting of engines of torture, made of iron, and put on board to lock the feet, arms, and heads together, of such as the Spaniards called English heretics. Bilboes, being instruments also made of iron for yoking the English prisoners two-and-two. Spanish shot, of which there are four different sorts—spike-shot, star-shot, chain-shot, and link-shot, all admirably contrived, as well for the destruction of the masts and rigging of ships, as for sweeping the men off the decks. The banner, with a crucifix on it, which was to have been carried before the Spanish general. An uncommon piece of arms, consisting of a pistol in a shield, contrived in such a manner that the pistol might be fired, and the body covered at the same time; it is to be fired by a match-lock, and the sight of the enemy taken through a little grate in the

shield, which is pistol-proof. The Spanish ranceur, made in different forms, and intended either to kill the men on horseback, or to pull them off their horses; and on one of them is a piece of silver coin, which the Spaniards intended to have made current in England. The Spanish officers' lances, finely engraved and gilt. The common soldiers' pikes, eighteen feet in length, pointed with long sharp spikes, and shod with iron. The Spanish general's shield, which was to have been carried before him as an ensign of honor; upon which are depicted, in most curious workmanship, the labors of Hercules.

Here also are deposited several Danish and Saxon clubs, a sort of weapons which the Danes and Saxons are said to have used in their conquests of England; an instrument called King Henry VIII.'s walking-staff, with three match-lock pistols in it, and coverings to keep the charges dry; a large wooden cannon, called Policy, because, as is said, when King Henry VIII. besieged Boulogne, the roads being impassable for heavy cannon, he caused a number of these wooden ones to be made, and mounted on proper batteries before the town, as if real cannon, which so terrified the French commandant, that he gave up the place without firing a shot; and the axe with which Anne Bullen, the mother of Queen Elizabeth, and the Earl of Essex, the favorite of Queen Elizabeth, were beheaded.

The other curiosities in this place are, a train of little cannon, neatly mounted on proper carriages, being a present from the foundry of London to King Charles I. when a child, to assist him in learning the art of gunnery; weapons made with the blades of scythes, fixed straight to the ends of poles, and taken from the Duke of Monmouth's party at the battle of Sedgmoor, in the reign of James II.; the partisans that were carried at the funeral of King William III.; and a model of an admirable machine, the design of which was brought from Italy, by Sir Thomas Lombe, at the hazard of his life.

The latter object of attention is a mill for the manufacture of silk, and was first erected in the year 1734, by Sir Thomas, at his own expense, in an island of the river Derwent, facing the town of Derby. It works three capital engines for making organzine, or thrown silk; has 26,586 wheels; and 97,746 movements, which are all worked by one water-wheel, that turns round three times in a minute. By every turn of the water-wheel, the machine twists 73,726 yards of silk thread, so that in twenty-four hours it will twist 318,496,320 yards; yet any single wheel or movement may be stopped, without impeding the rest; and the whole is governed by one regulator.

This machine was thought of such importance by the legislature, that, on the expiration

of the patent which Sir Thomas had obtained for the sole use of it during 14 years, the parliament granted him 14,000*l.*, as a farther recompense for the hazard he ran, and the expense he had incurred, by introducing and erecting it, on condition that he should suffer a perfect model of it to be taken, in order to secure and perpetuate the invention.

Northward of the White Tower is a noble building, called the Grand Store-house, extending 245 feet in length, and 60 in breadth. It was begun by King James II., and finished by William III., who erected that magnificent room called the New, or Small Armory, to which there is a passage by a folding-door, adjoining to the east end of the Tower chapel, which leads to a grand staircase of easy ascent. On the left side of the uppermost landing is a workshop, in which are constantly employed about fourteen furbishers, in cleaning, repairing, and arranging the arms contained in this place; which are so artfully disposed, that at one view may be seen arms for nearly 200,000 men, all bright and fit for service at a moment's warning. Of the disposition of these arms no adequate idea can be formed by description; and there are a thousand peculiarities in the disposition of so vast a variety which no description can reach.

Upon the ground-floor, under the Small Armory, is a large room of equal dimensions with that, supported by twenty pillars, all hung

round with warlike implements. This room, which contains the royal train of artillery, is 24 feet high, and is full of the most dreadful engines of destruction; besides harness for horses, men's harness, drag-ropes, trophies of standards, colors, &c.

Eastward of the White Tower, is the Horse Armory, consisting of a plain brick building, in which are several curiosities.

Before the room-door is the figure of a grenadier in his accoutrements, as if upon duty, with his piece rested upon his arm. Within the room, on the left hand, are figures as large as life, of horse and foot, supposed to be drawn up in military order, to attend a line of kings on the other side of the room, shown in the following order: King George I. in a complete suit of armor, with a truncheon in his hand, seated on a white horse, richly caparisoned, having a fine Turkey bridle gilt, with a globe, crescent, and star, velvet furniture laced with gold, and gold trappings. King William III. dressed in the suit of armor worn by Edward the Black Prince, at the battle of Cressy; he is mounted on a sorrel horse, whose furniture is green velvet, embroidered with silver, and holds in his right hand a flaming sword.

King Charles II. dressed in armor, with a truncheon in his hand, seated on a fine horse, richly caparisoned, with crimson velvet, laced with gold. King Charles I. in a rich suit of gilt armor, curiously wrought, presented to him

by the city of London, when he was Prince of Wales. James I. in a complete suit of figured armor, with a truncheon in his right hand. King Edward VI. in a curious suit of steel armor, whereon are depicted, in different compartments, a variety of scripture histories; he sits like the rest on horseback, with a truncheon in his hand. King Henry VIII. in his own armor, which is of polished steel, with the foliages gilt, and bearing a sword in his right hand.

King Henry VII., who also holds a sword, and is seated on horseback in a complete suit of armor, finely wrought, and washed with silver. King Edward V., who, with his brother Richard, was smothered in the Tower, by order of their uncle and guardian Richard III.; and having been proclaimed king, but never crowned, a crown is suspended over his head; he holds a lance in his right hand, and is dressed in a rich suit of armor. King Edward IV. in a bright suit of armor, studded, with a drawn sword in his hand. King Henry VI., Henry V., and Henry IV. King Edward III. with a venerable beard, in a suit of plain bright armor, with two crowns on his sword, alluding to his having been crowned king both of England and France. King Edward I. dressed in a very curious suit of gilt armor, and in shoes of mail, with a battle-axe in his hand. And William the Conqueror, the first in the line, though the last shown, in a suit of plain armor.

The other principal curiosities in this room

are a large tilting-lance of Charles Brandon, duke of Suffolk; a complete suit of armor, made for King Henry VIII. when he was but eighteen years of age, rough from the hammer; a small suit of armor made for King Charles II. when he was about seven or eight years of age, with a piece of armor for his horse's head; real coats of mail, called Brigandine jackets, consisting of small bits of steel, so artfully quilted one over another, as to resist the point of a sword, and perhaps a musket-ball, and yet so flexible, that the wearer may bend his body any way, as well as in an ordinary suit of clothes; an Indian suit of armor,* sent by the Great Mogul as a present to King Charles II.; the armor of John of Gaunt, Duke of Lancaster, the son of Edward III.; and a droll figure of one William Somers, said to have been jester to King Henry VIII.

Over the door of the armory, on the inside, is a target, on which are engraved the figures of Justice, Fortune, and Fortitude; and the walls of the room are entirely lined with various pieces of armor for horses' heads and breasts, targets, and many pieces that now want a name.

About twenty yards east of the grand store-

* This is reckoned a great curiosity, being made of iron quills, each about two inches long, finely japanned, and ranged in rows, one row easily slipping over another; these are bound together with silk twist, and are used in India as a defence against darts and arrows.

house, or new armory, is the Jewel-office: a dark stone room, in which the jewels of the crown are deposited. The jewels shown at this time are the following:

The imperial crown, with which it is pretended all the kings of England have been crowned, since Edward the Confessor, in 1342. It is of gold, enriched with diamonds, rubies, emeralds, sapphires, and pearls. The cap within is of purple velvet, lined with white taffety, turned up with three rows of ermine. The golden orb, or globe, put into the king's right hand, before he is crowned; and borne in his left, with the sceptre in his right, upon his return into Westminster Hall, after he is crowned at Westminster Abbey.

The globe is about six inches in diameter, edged with pearl, and enriched with precious stones. On the top is an amethyst of a violet color, nearly an inch and a half high, set with a rich cross of gold, adorned with diamonds, pearls, and other jewels; the whole height of the ball is eleven inches.

The golden sceptre, with its cross set upon a large amethyst of great value, garnished round with table-diamonds. The top rises into a fleur-de-lis of six leaves, all enriched with precious stones; from whence issues a mound, or ball, made of the amethyst already mentioned. The sceptre with the dove, the emblem of peace, perched on the top of a small Jerusalem cross, finely ornamented with table-

diamonds, and jewels of great value. St. Edward's staff, four feet seven and a half inches in length, and three inches three quarters in circumference, all of beaten gold, which is carried before the king at his coronation. The rich crown of state worn by his majesty in parliament, in which is a large emerald, seven inches round, a pearl, esteemed the finest in the world, and a ruby of inestimable value. The crown belonging to the Prince of Wales, which is carried, together with the king's crown, as often as his majesty goes to the parliament-house, by the keeper of the jewel-office, attended by the warders, to Whitehall, where both crowns are delivered to the officers appointed to receive them, who, with some yeomen of the guard, carry them to the robing rooms adjoining to the House of Lords, where his majesty and the Prince of Wales put on their robes. The king wears his crown on his head while he sits upon the throne; but that of the prince is placed before him. As soon as the king is disrobed, the crowns are carried back to the tower, and again locked up in the jewel-office.

The crown, globe, and sceptre of Queen Mary, with the diadem she wore at her coronation with her consort William III. An ivory sceptre, with a dove on the top, made for the queen of James II., whose garniture is gold, enamelled with white. The curtana, or sword of mercy, the blade of which is thirty-two inches

long, and nearly two broad, without a point, carried before the king at his coronation, between the two swords of justice. The golden spurs, and the armillas, or bracelets for the wrists, which, though very antique, are worn at the coronation. The ampulla, or eagle of gold, which is finely engraved, and holds the holy oil the kings and queens of England are anointed with; and the golden spoon that the bishops pour the oil into. The eagle and spoon are pieces of great antiquity; the former, including the pedestal, is about nine inches high, and the wings expand about seven inches; the head of the eagle screws off about the middle of the neck, which is made hollow for holding the holy oil; and when the king is anointed, the oil is poured into the spoon out of the bird's bill.

A rich salt-cellar of state, in the form of the square white tower; the workmanship is exquisitely fine: it is of gold, and used only on the king's table at the coronation. A noble silver font, doubly gilt, and elegantly wrought; in which the royal family are christened. And a large silver fountain presented to Charles II. by the town of Plymouth, curiously wrought. Here also are deposited all the crown jewels worn by the princes and princesses at coronations, and an abundance of curious old plate.

THE CROTON WATER WORKS.

The Croton Aqueduct was designed to supply the city of New York with an abundance of pure and wholesome water. It commences about six miles above the mouth of the Croton river, where a dam has been constructed to elevate the water of the river 40 feet, to the level of the head of the aqueduct, or 166 feet above mean tide. The course of the aqueduct passes along the valley of the Croton to near its mouth, and thence passes into the valley of the Hudson. At eight miles from the Croton dam, it reaches the village of Sing Sing, and continues south through the villages of Tarrytown, Dobbs' Ferry, Hastings, and Yonkers. It thence proceeds to the Harlem river, which it crosses, and thence passes along to the receiving reservoir, bounded north by 86th street.

The Croton Aqueduct, with all its fixtures and appendages, is the most extensive and important work of the kind ever undertaken in the United States. Of its magnitude and utility, persons can have but little conception, unless they have examined its mechanical execution, or witnessed its salubrious influences upon the health and comfort of the people for whose benefit it was originally designed. The citizens of the city of New York now consider it indispensably necessary for the ordinary purposes of life; nor can they imagine how they

were ever enabled to live contentedly without the use of it.

The Croton Aqueduct, as a work of enterprise, mechanical skill, and philanthropic regard to the social enjoyments of a large city, should be classed among the most distinguished productions of art in the whole world. It does not indeed compare in the amount of its mason work with the pyramids of Egypt. It did not indeed require one hundred thousand men for the average period of human life to complete it—the sum of labor consumed in one of those proud monuments of antiquity. What an absolute despotism was necessary to control this labor! What a destitution of sympathetic feeling must have been evinced in thus dooming to a species of slavery so many human beings! And yet for no other object than to gratify the pride of a single individual in the erection of his own mausoleum!

But while the Egyptian pyramids remain monuments of the folly, or the pride, or the cruelty, of their builders; the Croton Water Works will remain in all coming time the monument of the wisdom, and the liberality, and the beneficence of a people deserving to inhabit the empire city of America. And here strangers will repair, from generations now unborn, to quaff its limpid and unfailing currents, and in loitering round its sparkling fountains, to inhale an atmosphere made healthful by its cooling vapors. They will tell of the

glory of its projectors and of the benedictions of uncounted thousands that will forever embalm their memory.

The simple matter of a tunnel of solid mason work, seven and a half feet in width, nine feet high, and forty miles long, is far from comprising the whole of this immense undertaking. The great dam in the Croton river; the magnificent stone aqueduct at Sing Sing; the bridge across the Harlem river; and the main reservoir in the city, are all costly and stupendous works. Each one of these would furnish materials for curious calculation to the mechanic or the man of science.

The dam across the Croton is placed where the river enters between the hills, after having passed for several miles through a more level country. The hill on the south side is solid rock, and on the north excellent earth for constructing the dam. The dam itself, as might be conjectured from its position, is not of great length, but is one of the most ingenious works of substantial masonry anywhere to be found.

The highest point of the structure is rather more than fifty feet above the natural bed of the Croton. The water will be thrown back by this elevation more than three miles, forming a beautiful lake of four hundred acres; the whole margin of which is excavated, so that the water will be nowhere less than three feet deep; thus forming the great fountain head, which will contain about 100,000,000 of

gallons for each foot in depth from the surface.

The water is drawn into the aqueduct by means of a tunnel cut into a rock which constitutes the hill on the south side. At distances of one mile, a circular hollow tower is erected over the aqueduct, for the purpose of ventilation; these being composed of white marble produce a very fine effect. Every three miles is an apparatus for drawing off the water in case any internal repairs should be necessary. But the most imposing structure of the whole work, is the great bridge at Sing Sing. It is composed chiefly of one grand arch of eighty-eight feet span, thrown over a deep ravine, so that from the apex of the arch to the bottom of the ravine must be a hundred feet.

This vast arch was so firmly laid in its abutments, and so securely built in its superstructure, that since the uprights were removed from beneath the arch, it has settled but one inch. So little settling in such a work, we are told, has never before occurred. The whole quantity of land which the water commissioners have been compelled to buy on the whole course of the works, amounts to nine hundred acres; and the average price has been nearly five hundred dollars per acre.

The plan of the bridge across the Harlem river is for a work 1450 feet in length, although the stream is but 620 feet wide where it crosses. This increased length is owing to the

inclination of its banks. The proposed number of piers, built of stone, was to be sixteen; of which six were to be in the water and ten on the land. The land piers are less than those in the water, and their height varies according to the slope of the banks of the river. By means of this bridge, the Croton water is carried across the Harlem river in two cast-iron pipes, each four feet in diameter, which lie 12 feet below the grade line of the aqueduct. The object of using pipes in this case, is more effectually to secure the conduit from leakage.

The main reservoir, situated near Bloomingdale, covers 35 acres of ground, divided into two sections; the north section to have 20 feet of water when full, and the south 25 feet; both will contain about 160,000,000 gallons of water. From this reservoir the water is conveyed through the Fifth Avenue to the distributing basin at Murray's Hill, between 40th and 42d streets, and is three miles from the City Hall. It covers five acres and will hold 20,000,000 gallons. From thence the water is conveyed to the dwellings in the city by ordinary distributing pipes. The descent from the dam in the Croton river to Murray's Hill, is about 46 feet, being a fraction less than 14 inches to the mile. The entire length of the aqueduct, including the main pipes running from the distributing reservoir through the central part of the city, is nearly fifty miles.

A large proportion of the open cutting, and

nearly all the tunnel cutting, has been through rock. More than 400,000 cubic yards of rock have been excavated. There are on the line sixteen tunnels, varying in length from 160 to 1263 feet, making an aggregate length of 6841 feet. In Westchester county there are twenty-five streams crossing the line of the aqueduct, that are from 12 to 70 feet below the grade line, and from 25 to 83 feet below the top covering of the aqueduct. And to pass the streams that intersect the whole line, and the land floods, there have been constructed under the aqueduct 114 culverts, whose aggregate length is 7959 feet.

It has already been stated that the Croton reservoir, or lake, as it is now generally styled, covers about 400 acres of land. It is available as a reservoir for 500,000,000 gallons of water, above the level that would allow the aqueduct to discharge 35,000,000 gallons per day. The flow of the Croton is about 27,000,000 gallons in twenty-four hours at the lowest stages, which continues, with moderate rises by occasional rains, from two to three months in the year. This may be considered the minimum capacity of the river.

When, therefore, the wants of the city shall require a daily supply of 35,000,000 gallons, it will be necessary, during the season of lowest water, to draw daily from this reservoir 8,000,000 gallons, to make up the deficiency in the natural flow of the river. This amount

the reservoir would supply for sixty-two days, without any aid from occasional rains; which may safely be relied upon to keep up the required supply from the reservoir, beyond any drought we have ground to apprehend. The supply of the Croton from its daily flow, aided by this reservoir, may therefore be taken with great confidence at 35,000,000 gallons, which will be very ample for the wants of the city for a long time to come; and when the day arrives that it will require a larger quantity, it may be obtained by constructing other reservoirs farther up the stream, where there are abundant facilities for such purposes. To the present time the average flow of water, since its introduction into the Croton aqueduct, has been about 14,000,000 only; less than half of what might be had.

The entire cost of the Croton Water Works will amount to at least $12,500,000. The city of New York presents, it is believed, the only instance of a comparatively small city, not exceeding, at the time of engaging in the enterprise, 280,000 inhabitants, (which is small compared with European cities,) voting that it should be undertaken in a style and on a scale greatly beyond their actual or any imaginable future wants; but which, designed to endure for ages, would bear record to those ages, however distant, of a race of men who were content to incur present burdens, for the benefit of a posterity they could never know.

Having resolved on the work, they carried it on with a degree of constancy and energy alike remarkable, so that in the period of five years an aqueduct was completed, ample in its capacity, and in its workmanship worthy of universal admiration. Nor is it less remarkable that all this was accomplished amidst difficulties of no common kind. Financial difficulties, during periods of its progress, paralyzed, in no small degree, the financial operations of the whole country; extending also to the main portions of the civilized world. However, the city resolved that means should be provided; and they were promptly and amply provided.

Nor ought the fact to be overlooked, that not only is the most ample provision made for the ultimate payment of the principal of the loan contracted in the building of the work; but also for the interest thereof, amounting annually to the sum of $665,000. To this end the entire revenues of the aqueduct are pledged, together with the other resources of the city sinking fund, so that by the year 1880, not a vestige of that loan will remain. Thus will the pecuniary obligations of New York, incurred in the construction of this gigantic work, be strictly discharged, while the present age will be making a free gift to all subsequent generations, of what may well compare with the works which Rome points to, as constituting the most valuable monuments of her ancient glory.

The Greeks had their aqueducts, so have many modern nations; but it is at Rome we chiefly are to look for the greatest wonders in this department of the useful arts. The aggregate length of eight of her principal aqueducts was 275 miles; and Frontinus, who lived in the first century, when the population of Rome was computed at from 1,000,000 to 1,200,000, states that the daily supply from these works was 196,000,000 gallons, equal to 196 gallons to each individual. Of this profuse use of water, we may form some conjecture, by a reference to the fact, that London, with twice the population, consumes but 37,000,000, or the fifth part of the supply of ancient Rome.

The fountains of the Croton aqueduct, as yet, do not compare with those of an older date in other countries for architectural decorations. Those of the Bowling Green, the Park, and of Union Place, however, may be referred to as not surpassed in capacity for aquatic display by any similar works, even of the proud capitals of continental Europe. Hereafter, no doubt, they will each receive embellishments creditable to the city.

But there are other considerations that properly enter into our estimate of the value of the Croton Water Works. The use made of the water for cleaning the streets will be found among the best preservatives of health. And the plentiful supply of it has done much, and

will continue to do much, to secure property from loss by fire. There is now a feeling of security with the owners of property before unknown in New York. The knowledge of the fact, that it may be had on any occasion however sudden, and in any quantity however large, in the large warehouses, will not only lead many persons to feel this security, and hence in large stocks of merchandise not to insure the same to the full amount as heretofore; but in the reduction of premiums to save large sums in what is insured.

It is impossible to state the amount of property—real estate, furniture, and merchandise—insured against loss from fire in New York. However, from the known appraised value of the real estate, most of which is insured in some form or other; and from the best available data on which to make an estimate for the merchandise actually insured or liable to insurance, it may be presumed that the amount of premiums for insurance in New York, is not less annually than $400,000. Since the free introduction of the Croton water, the rates of premium have declined at least forty per cent. The whole of this reduction may not have been occasioned by that alone; but it is fair to presume, that the Croton water has made a direct annual saving of insurance in New York of not less than $100,000.

PAPER MAKING.

Paper, thin sheets of a vegetable substance used as a vehicle for writing, was so named from the papyrus, the leaves of which plant originally did, and still do, serve certain nations for that purpose.

That paper may be made from any vegetable substance, is evident from the fact of its having been recently produced from oak sawdust; after which, it is scarcely necessary to enumerate the various other materials from which it is also manufactured.

The paper of the Egyptians is made of the papyrus, a rush growing on the banks of the Nile, as already mentioned. Chinese paper is of various kinds, as of the rinds of barks of trees, especially of the mulberry, the elm, the bamboo, and the cotton tree. Cotton paper has been in use upwards of six hundred years, and is still made in the East Indies by beating cotton rags to a pulp. Paper made of straw is now used in London; and a whole genus of aquatic vegetables, known by the name of conferva, have lately been applied to this purpose in Germany.

Though this latter may be an original discovery of the professor who has brought it forward, the practice was formerly realized in Scotland, as appears from a notice in Lightfoot's Flora-Scotica, respecting the conferva bullosa, or craw-silk.

"It is a soft substance, and in pure water, where the threads grow long, resembles tow: but in muddy waters, where they are short, it is not unlike cotton; which being carefully collected undried, turns whitish, and has sometimes been used instead of it, either as wadding to stuff garments with, or to make towels or napkins. We have also seen a coarse kind of paper made of it, at Edinburgh."

"This substance," says a correspondent of the Monthly Magazine, "may be met with in great abundance in almost every ditch and pool, especially in old clay-pits and in most slow streams. In cold weather it is always below the surface of the water, and forms a mass of yellowish green fibres, very fine, and interlacing each other in every direction. In summer it rises to the surface in large fleece-like masses, commonly of a deep-green color and a spongy texture, enclosing numerous globules of air, to which it owes its buoyancy. If raked out of the water, and exposed for a few days to the sun, it loses its green color and becomes very tolerably bleached."

Linen paper, or that made of cloth produced from flax, the last species to be mentioned, appears to have been first introduced about the beginning of the fourteenth century; but by whom it was invented is not known. The manufacture of this paper, of which kind are the present sheets, is effected by the following processes: after procuring rags from the deal-

ers in that commodity, the first and most disagreeable operation is that of sorting them.

This, however, must be done with care; for upon a due selection depends, in the first instance, the purity of the paper. The rags are then put into the dusting engine, a circular wire sieve, where they are exposed to running water and cleansed. They are next conveyed to the mill: there they are put into a large vat or cistern, through which clear water is constantly flowing. In this cistern is placed a cylinder, about two feet in length, set thick round with rows of iron spikes, placed as near as may be without touching each other. At the bottom of the trough are corresponding rows of spikes. The cylinder is made to whirl round with great rapidity; and the iron teeth rend and tear the rags in every possible direction.

At length, with the softening assistance of the water, they are thoroughly masticated and reduced to a fine pulp; while, by the same process, all their impurities are washed away and they are left perfectly white. This operation is performed in about six hours. For the sake of color, a quantity of common light blue, or azure, is sometimes added, which gives the paper a bluish cast. This practice, however, was not formerly in use; and now generally is rejected, as in the paper that bears these observations.

The fine pulp is next put into a copper of

warm water. This is the substance of paper, to which a form is now to be given by means of a mould. This utensil bears a general resemblance to a sieve. In the old manner, its surface was composed of wire bars crossed with others of a finer texture, the form of which may be discovered by holding paper made on such moulds to the light. It is by these wires, which take from the thickness of the paper, and consequently give a transparency, that what are called the water-marks are produced; and the water-marks may be of any form, according to the wire-worker's design, as is exemplified in the modern bank-paper.

The paper, however, which is called wire-wove, and that used for drawing, and which has no other mark than the maker's name, is made upon moulds, the wired bottom of which is extremely fine, with the wires closely interwoven; and some examples of inferior wove paper exhibit this crossing of the wires, as plainly as the bars are perceived in that made after the old manner.

This mould is dipped horizontally into the copper containing the pulp, and immediately taken out. By means of its wooden frame, it retains just so much pulp as is wanting for the thickness of the sheet, while the superfluity returns through the interstices of the wires. A second hand, called a coucher, instantly receives it from the dipper, called a vat-man;

opens the frame and turns out the sheet, (which now has shape, but not consistence,) on a cloth of soft felt, which is spread on the ground to receive it.

Over this is laid another piece of felt, which receives another sheet of paper; and the pile is thus increased, till forty or fifty sheets are formed. These are then removed to a large screw-press, moved by a long lever, which forcibly squeezes the water out of them, and gives them immediate consistence; after which, the felt and paper are separated; and the latter, which is thrown on one side while the former is thrown on the other, is taken up with an instrument in the form of the letter T, three sheets at a time, and hung on lines to dry. It hangs for a week or ten days, during which its whiteness is increased, and then passes through the hands of women called pickers, who with proper instruments remove knots, dirt, or other imperfections.

It is then sized, without which operation it would not bear ink or any liquid. The sheets are just dipped into the size and taken out again. The exact degree of sizing is a matter of nicety, to be understood only through experience. The paper is hung up to dry a second time; and when this object is completed, it is taken to the finishing room, when the faulty sheets are rejected, and the perfect pressed in dry presses, which give them their ordinary degree of smoothness; counted into quires and

reams; and packed for sale to the stationer, by whom they are retailed to the public.

The stationer also cuts the edges, and causes it, for various purposes, to be gilt or hot-pressed; which latter operation is performed by means of heated copper plates. The whole process at the paper-mill occupies about three weeks. The part performed by the power of the mill itself, is that of reducing the rags to a pulp, as before described.

The manufacture of paper was commenced in the United States about the year 1760, and was then deemed of so much importance, that the colonial legislature of Connecticut, without consulting the interests of the mother country, offered a bounty on every ream made within their jurisdiction. Its progress was slow and uncertain, notwithstanding the reward of high prices, until the establishment of a tariff of duties, which effected the total exclusion of foreign papers of the ordinary kinds.

From that time to the present, the quantity manufactured has rapidly increased, and prices constantly declined. Machinery of the most perfect and expensive kind has been introduced, and there is no description of paper that may not now be as well manufactured here as abroad. The facilities for supplying the country are ample, and so great is the competition, that prices are reduced to the lowest remunerating rates.

In illustration of the unexampled increase of consumption, it may be stated, that in the year 1825 the circulation of the daily and weekly press in the city of New York was equal to *fifteen thousand* copies per day; while at the present time the same circulation is equal to *one hundred and thirty thousand* copies, and of a size very much enlarged. The diminution of prices in the mean time, quality considered, is fully equal to one half.

Our paper-making interest, in all its details and connections, extends its influence over the whole body of the community, and affects, in one way or another, more individuals, probably, than any other branch of manufacture of equal magnitude. The material for its support is drawn from every inhabited house in the land; and the products of the paper-mill, in one form or other, enter into the daily use of every family and every branch of business.

The capital invested in the business is estimated, on a careful investigation, at sixteen millions of dollars; and the annual proceeds at fifteen millions; the number of mills being at least six hundred, distributed over twenty-two States of the Union; and the number of persons deriving their support from the business, at not less than fifty thousand. This capital is not monopolized by a few wealthy individuals or companies, but, with few exceptions, is held by men in moderate circumstances, and to a great extent by those who con-

tribute their own labor in the prosecution of the business.

The amount of stock consumed in all branches of this manufacture, is about eighty-five thousand tons per annum; of which at least seventy-five thousand tons are of domestic origin, and worth five millions of dollars. This very considerable item is emphatically the savings of the poor and economical,—a clear gain to those who most need it, and a dead loss to the country, should our manufactures be broken down.

The amount of transportation, by land and water, incident to this branch of manufacture, is not less than two hundred thousand tons per annum, constituting no inconsiderable item of income to our coasting vessels, railroads, canals, and teamsters. The gross amount thus annually paid cannot fall short of half a million of dollars.

We will but make a passing reference to the agricultural interest, as connected with this branch of industry. And surely the supplying fifty thousand persons, totally dependent for their daily food on the surplus products of the neighboring farmers, is a consideration of no small importance to this class of our population.

We might proceed to enumerate various other interests, whose welfare is connected with that of the paper manufacture; but enough has been said to show the extent, and to suggest

its importance as a branch of national industry. The intimate connection between the several branches of national industry, and their mutual dependence on each other for a healthy condition of the whole, cannot fail to be realized by every enlightened statesman, and need not here be urged.

CANALS.

A CANAL is an aqueduct made for the purpose of inland navigation. This great improvement in the conveyance of commodities has attained a high degree of perfection, and enables us to transport them even over mountains where it would appear impossible to preserve a communication, or rather a continuity of water carriage with the subjacent plains. This is effected by means of locks built of masonry, each of which serves as the conjunction of two different levels.

The locks are made only large enough to admit the vessels employed in the business, and have two gates, one at each end. When a vessel should ascend to a superior level, the upper gate is shut, and the vessel being brought within the lock, the lower gate is closed, and the upper one opened. By this means the water flows in, and the vessel is raised to the intended height. The upper gate is closed as soon as the vessel has passed, but the water in

the lock is preserved for the purpose of letting a vessel down, which is done by shutting the upper gate after she is in the lock, and opening the lower one ; so that she is gradually lowered to the next level.

The water in all cases is let in or out by means of a small hatch, making its rise and fall very gradual ; else the gates would be torn from their hinges by the rush of so large a body, and the vessel would be endangered. " All canals," says an intelligent writer on this subject, " may be considered as so many roads of a certain kind, on which one horse will draw as much as thirty horses on ordinary turnpike roads, or on which one man alone will transport as many goods as three men and eighteen horses usually do on common roads.

" The public would be great gainers were they to lay out upon the making of every mile of a canal twenty times as much as they expend upon a mile of turnpike road ; but a mile of canal is often made at a less expense than a mile of turnpike : consequently there is a great inducement to multiply the number of canals." The advantages resulting from canals, as they open an easy and cheap communication between distant parts of a country, will be ultimately experienced by persons of various descriptions ; and more especially by the manufacturer, the occupier or owner of land, and the merchant.

The nations that appear to have been first

civilized, were those that dwelt round the coast of the Mediterranean Sea, which, from a variety of circumstances, was extremely favorable to the early navigation of the world. Of all the countries on the coast of the Mediterranean, Egypt seems to have been the first, in which either agriculture or manufactures were cultivated or improved to any considerable degree. Upper Egypt extends no more than a few miles from the Nile, and in Lower Egypt that great river breaks itself into many different canals, which, aided by a small degree of art, seem to have afforded a communication by water carriage, not only between all the large towns, but between all the considerable villages, and even to many farm-houses in the country; nearly in the same manner as the Rhine and the Maese do in Holland at present.

The extent or facility of this inland navigation was probably one of the principal causes of the early improvement in agriculture; and manufactures seem likewise to have been of very great antiquity in the provinces of Bengal in the East Indies, and in some of the eastern provinces of China. In Bengal, the Ganges and several other large rivers form a great number of navigable canals, in the same manner as the Nile does in Egypt. The case is the same in the eastern provinces of China, where several large rivers form, by their different branches, a multitude of canals, and by

communicating with one another afford an inland navigation much more extensive than that either of the Nile or the Ganges, or perhaps of both united.

It is remarkable, however, that neither the ancient Egyptians, nor the Indians, nor the Chinese, encouraged foreign commerce; but they all seem to have derived their extraordinary opulence from this inland navigation. On the other hand, those nations that have been destitute of the means of inland navigation, either by the rivers or canals, have remained from one age to another in the same barbarous and uncivilized state. This observation is exemplified in the state of all the inland parts of Africa, and of that part of Asia which lies at any considerable distance north of the Euxine and Caspian seas, the ancient Scythia, and the modern Tartary and Siberia.

The commerce that may be carried on by means of a river, which does not break itself into any great number of branches or canals, and which runs into another territory before it reaches the sea, can never be very considerable; because it is always in the power of the nation, who possesses that other territory, to obstruct the communication between the upper country and the sea.

Thus the navigation of the Danube is of very little use to the different states of Bavaria, Austria, and Hungary, in comparison of

what it would be, if any of them possessed the whole of its course till it falls into the Black Sea.

The canals of Holland and Flanders are innumerable; and they serve the purpose of our public roads, so that the inhabitants may travel by means of them, and convey commodities for consumption or exportation, from one part of the country to another, as occasion requires. An inhabitant of Rotterdam, it is said, by means of these canals, may breakfast at Delft or the Hague, dine at Leyden, and sup at Amsterdam, or return home again before night. By them also a prodigious inland trade is carried on between Holland, France, Flanders, and Germany.

When the canals are frozen over, they travel on them with skates, and perform long journeys in a very short time, while heavy burdens are conveyed in carts and sledges which are then as much used on the canals as in our streets and roads. The profits which have accrued from these canals have been immense; and their amount almost exceeds belief. It is said that they have yielded more than £250,000 for about forty miles of inland navigation.

The canals of Holland are generally sixty feet wide, and six feet deep. They are generally level and need no locks; and they are commonly elevated above the country for the purpose of carrying off the waters, which in winter inundate the land. In the province of Deft-

land, not more than sixty miles long, 200 windmills are employed in spring, to raise the water into the canals. On the dams or banks by which they are bordered, and which are kept in repair at great expense, depends the security of the country from inundation.

The first canal made expressly for the purpose of inland navigation, in England, of which we have any authentic account, is that of Sankey, cut in order to convey coals from the pits to Liverpool; for which an act of parliament was procured, 1753. The duke of Bridgewater, however, is considered the founder of that system of inland navigation, which has added so much to the wealth of Great Britain. It is stated, that there are at present in that country one hundred and three canals, the total extent of which is two thousand six hundred and eighty-two and a quarter miles, which cost thirty millions sterling.

This estimate of the cost gives an average of something more than eleven thousand pounds per mile. There are in the various canals forty-eight subterranean passages, forty of which have an extent of thirty-two miles. Such has been the effect, by opening new countries to cultivation, by exploring the coal, iron, lime, and other minerals, and founding vast manufactories upon them, that every part of that island which is supplied with water communication, is enabled to extend its commerce to every part of the world, and to obtain resources for support-

ing its power, both by sea and land, which no other human means could enable it to do.

IMPERIAL CANAL OF CHINA.

In some respects China surpasses all other countries in canals. They are not constructed on the same scientific principles as those of Europe, nor composed like them of standing water, fed by reservoirs, elevated and lowered by locks. They are formed merely by turning aside the course of a river, and conducting its waters, by an artificial channel, till they join those of another river, from the other side of which the line is continued. The want of locks obliges the Chinese to conduct their canals by lines winding round the different elevations which are encountered in their courses.

The Imperial Canal of China is undoubtedly the greatest work of the kind in the world. Mr. Barrow gives the following description of it. All the rivers, he observes, of note in China fall from the high lands of Tartary, which lie to the northward of Thibet, crossing the plains of this empire, in their descent to the sea, from west to east. The inland navigation being carried from north to south, cuts these rivers at right angles, the smaller streams of which terminating in it, afford a constant supply of water: and the three great rivers, the Eubo to the north, the Yellow River towards

the middle, and Yang-tse-kiang to the south, intersecting the canal, carry off the superfluous water to the sea. The former, therefore, are the feeders, and the latter the dischargers of the great trunk of the canal.

A number of difficulties must have arisen in accommodating the general level of the canal to the several levels of the feeding streams; for, notwithstanding all the favorable circumstances of the face of the country, it has been found necessary, in many places, to cut down to the depth of sixty or seventy feet below the surface; and in others to raise mounds of earth upon lakes, and swamps, and marshy grounds of such a length and magnitude, that nothing short of the absolute command over multitudes could have accomplished an undertaking, of which the immensity is exceeded only by the great wall of China.

These stupendous embankments are sometimes carried through lakes of several miles in diameter, between which the water is forced up to a height considerably above that of the lake; and in such situations we sometimes observed this enormous aqueduct gliding along at the rate of three miles an hour. Few parts of it are level; in some places it has little or no current: we had it one day setting to the southward at the rate of one, two, or three miles an hour, the next to the northward; and frequently, on the same day, we found it stationary and running in opposite directions.

This balancing of the level was effected by flood-gates, thrown across at certain distances, to elevate or depress the height of the water a few inches, as might appear to be necessary; and these stoppages are simply planks sliding in grooves, that are cut into the sides of two stone abutments, which in these places contract the canal to the width of about thirty feet. There is not a single lock, nor, excepting these, a single interruption to a continued navigation of 600 miles.

In approaching the Yellow River the imperial canal presents the grandest inland navigation in the world, being nearly 1000 feet in breadth, and confined on each side by stone quays, built with massy blocks of gray marble, mixed with others of granite. This immense aqueduct, thus forced up several feet above the surface of the country by those stupendous embankments, has numberless canals branching out in every direction; and for several miles, on each side, one continued town extends to the point of its junction with the river.

ERIE CANAL, NEW YORK.

The project for constructing this great work, fifty years since, would have been deemed chimerical. Indeed, at the time of its commencement, not a few entertained that opinion. Even President Jefferson, with all his sagacity,

ridiculed the idea of it. However, it was projected, and it was completed; and the enterprise places the author of it among the greatest men of the present or any preceding age. The following particulars are taken from "Hunt's Magazine," a publication containing more useful information for merchants and other business men than any other similar work.

This canal is the most extensive and costly work that has been constructed in the Union. Running through one of the most fertile and densely settled tracts of territory, for the distance of about three hundred and sixty-three miles, a portion being cut through the solid rock, richly adorned with locks and aqueducts, and employing a large number of men, as well as transporting the great bulk of the merchandise from the eastern to the western waters during a period of the last fifteeen years, we would devote a brief space to a consideration of the circumstances which have marked its progress to its final completion.

The particular character of the territory between lake Erie and the Hudson river, and the rapid increase of the population through its central portion, early attracted the notice of the public. As early as 1768, the attention of the provincial legislature was called to the subject by the governor of the province, but the state of that period, and the sparse settlements of the region, prevented the adoption

of any measures to improve it. No direct measures were, in fact, undertaken to perfect this line of communication until 1808, when a concurrent resolution was proposed by the legislature of New York, to direct a survey to be made of "the most eligible and direct route for a canal from the Hudson river to Lake Erie." During the year 1810, commissioners were appointed to examine the route, and this board consisted of De Witt Clinton, Governeur Morris, Stephen Van Rensselaer, Peter B. Porter, Simeon De Witt, William North, and Thomas Eddy, to which were afterwards added the names of Robert Fulton and Robert L. Livingston. The report of the board was drawn up by the able pen of Governeur Morris, which maintained the practicability of an inland canal, but at the same time proposed the plan of creating an artificial river from the elevation of lake Erie to the Hudson, and at the same time argued the facilities of an inclined plane canal, by which rivers and lakes were to be passed by aqueducts, and valleys by mounds.

That able and patriotic statesman, De Witt Clinton, took the lead in advancing the objects proposed by the survey, and on the presentation of the report to the legislature, introduced into the senate a bill for the purpose of continuing the investigations and preparing for the execution of the project. Fifteen thousand dollars were appropriated for further surveys,

and the commissioners were authorized to apply to the general government, or to those of any of the individual states, for assistance in accomplishing the canal. The war of 1812, however, soon intervened, and the measures projected for its completion were suspended.

On the return of peace, the subject of internal improvement was again pressed upon public attention; meetings were held, not only in the city of New York, but elsewhere, through which the legislature was memorialized in favor of the proposed improvements, and in 1816 a new board was formed similar to the former one, possessing the same powers, and established for the same general objects. Such energy and promptitude were displayed by the new board in the performance of their duties, that the legislature were enabled to act with effect, and on the 15th of April, 1817, a law was passed constituting the basis of the present system of internal improvement throughout the state of New York. On the fourth of July of that year, the work was commenced; and in 1825, the entire line was completed.

On the 26th of October, 1826, the water of Lake Erie was admitted into the canal, and a flotilla set out from the harbor of Buffalo, conveying the governor, the canal commissioners, and numerous distinguished persons, bearing the symbols of the junction of the waters of the lake and the ocean. The flotilla was increased at Albany by an escort of steamboats,

and when the aquatic procession entered the boundaries of the city of New York, the corporation and public authorities joined it, while signal cannon thundered out the tidings of the event from the harbor of Buffalo to the shores of the ocean.

The progress and successful completion of the Erie canal may be attributed, in a very considerable measure, to the energetic and patriotic exertions of De Witt Clinton. This distinguished statesman not only early perceived the importance of the work, but during its whole progress performed signal and untiring services in furtherance of the measure, by active personal services as board commissioner, and by drafting numerous cogent reports. So beneficial, indeed, had been his services to the state, in promoting its internal improvement, and so great advantages had been reaped by the establishment of those works, that two large and rich silver vases were presented to him by the merchants of New York, without distinction of sect or party.

The region throughout the entire line of the canal was indeed advanced in value to a great extent, through the agency of this great work. Furnishing a direct line of communication to the great metropolis of the country, the city of New York, it brought the agricultural resources of that region of country into a most valuable market, and at the same time furnished a cheap and safe line of transportation from

the Atlantic seaboard to the populous towns and thriving settlements which were beginning to spring up throughout the west. Villages also began to arise along the line of the canal, and became the depots of a rapidly increasing and prosperous trade. That portion of the interior of New York which had before spread out tracts of unsettled wilderness, was gradually subdued to agricultural industry, as the motives for cultivation increased by the opening of lines of transportation to new markets.

The increase of canal boats along the line of the canal, with the trampling of horses, and the clattering of the machinery of canal transportation, tended to enliven a scene which had before spread out a comparative solitude. In fact, the commercial metropolis of the country, the city of New York, derived the greatest benefit from the construction of the work, growing out of its increased trade, both in the supply of goods to the western interior, and in its being able to receive the agricultural products of the west in return.

This magnificent work is the most prominent in the nation, and has thus far yielded a large profit. Although it has more recently come into direct competition with the railroads which have been constructed through the same region, it has, notwithstanding, maintained its own share of the business of transportation. Traversing, as before remarked,

the distance of three hundred and sixty-three miles, being forty feet wide on the surface, twenty-eight at bottom, and maintaining a depth of four feet, it has been thought that the increase of its capacity would be a desirable object. A plan has accordingly been commenced, and partially carried out, to widen the canal to a breadth of sixty feet, and to deepen it two feet, a plan which, although attended with considerable cost, will add greatly to its value. As mere architectural adornments, some of its locks and aqueducts are splendid models of this species of masonry, and are as enduring as they are beautiful. This is especially true of the works at Lockport, and those which have been constructed over some of the principal rivers.

The cost of the enlargement is estimated at about $23,000,000. The boats chiefly employed for transportation on the original canal, average about 55 to 60 tons. The enlarged canal will, if ever completed, accommodate boats of the average capacity of about 150 tons; and, as the cost of towing will be increased in a much smaller ratio than that of the tonnage, the price of freights will be very materially diminished. This diminution is estimated at about 50 per cent.

The importance of the canal to the various interests of the country, and particularly to the interests of New York, will fully appear from a statement of the amount of property

which came to the Hudson river from the canal in 1844. The product of wood, including boards and scantlings, shingles, timber, staves, wood for fuel, and ashes, was $4,833,541. The product of animals, including pork, beef, cheese, butter, lard, and wool, was $6,930,971. The vegetable food, including flour, wheat, rye. corn, barley, other grain, bran and ship stuffs, peas and beans, potatoes and dried fruit, was $12,413,938. The other articles amounted to the sum of $4,058,260—making in all $28,235,810.

PERCUSSION LOCKS.

The percussion lock is a late and very useful invention. This lock has no pan. In the place of the pan, a small tube projects horizontally from the side of the gun. In this tube another small tube stands perpendicularly. The cock, instead of being formed to hold a flint, is shaped somewhat like a hammer, with a hollow to fit upon the tube last mentioned.

On this tube a little cap of copper is placed, in the bottom of which is a chemical mixture that kindles by percussion. This percussion is produced by the cock, which therefore requires a very strong spring. The powder is made in various ways, and of different materials; among others, of mercury, purified nitric acid, and spirit of wine freed from water. The copper

caps in which this chemical powder is placed are two and a half lines long and two lines wide. Sometimes the powder is also formed in pills, and then a somewhat different contrivance is required to place the pills, covered with a little wax, to protect them from moisture, in the small tube.

The advantages of a percussion lock are great: 1. Provided the spring of the cock is strong, and the chemical powder good, the gun cannot miss fire; (as to the latter, the sportsman must choose a good chemist,) while common locks are exposed to miss fire from many causes—bad flints, bad steel, bad priming, and weak springs. 2. The chemical powder explodes much more rapidly and forcibly than common powder, and therefore explodes the powder in the gun itself more forcibly, so as to produce a prompter and more effectual discharge. 3. The moisture of the air has hardly any influence: in a violent rain the lock is as sure to give fire as in the driest day. 4. The danger of an unintentional discharge is avoided; as long as the copper cap is not placed on the little tube, the gun cannot go off, even if the cock is snapped by mistake; while, with other guns, there is always danger, even when no priming has been put in the pan, because some grains may always escape through the touch-hole, and the cock may always be accidentally snapped.

The caps or pills which the sportsman must

carry with him are not dangerous, because it requires a very strong percussion to explode the powder. Percussion locks have come very much into use, and attempts have even been made to introduce them into armies, though the expense of the chemical powder may be an objection.

THE PENDULUM.

Pendulum, in Mechanics, is a heavy body, so suspended as that it may vibrate, or swing backward and forward, about some fixed point, by the force of gravity. The vibrations of a pendulum are called its oscillations. From the precision of its motions, it is employed in measuring time and space. The distance of a ship, from which a gun is fired, may be ascertained by measuring the interval of time between the flash and the sound of a gun; and, upon the same principle, the distance of a cloud, by numbering the seconds or half seconds between the lightning and the thunder. Thus, supposing that between the lightning and thunder ten seconds are counted, it follows (sound passing through 1142 feet in a second) that the distance of the cloud is 11420 feet. Height, also, as the height of a room, may be measured by a pendulum vibrating from its top; and, by the same instrument, the force of gravity on the various parts of the earth's surface is dis-

covered, and thence the true figure of the whole.

One imperfection belongs to the pendulum, the remedy of which is a great object of pursuit among men of science. It is that its length, upon which every thing depends, is perpetually liable to alteration, from the influence of heat and cold; the former of which expands, and the latter contracts, all metalline bodies.

Since the invention of the pendulum for the regulation of time, by Galileo, the object of the researches of all the artists and philosophers for the improvement of that art, has been to correct the defects arising from the contraction and expansion of metals by heat and cold. Harison, a celebrated English artist, has in some degree corrected these defects, by the invention of the "gridiron," put in practice by himself, by Cummings, and most of the eminent watch and clock makers in Great Britain and France. Mr. Le Paute, an eminent artist of Paris, and watchmaker to the king, invented a more simple pendulum; by which the expansion and contraction of metals are ingeniously shown, by the assistance of a hand and quadrant on the pendulum, which mark the different degrees of heat and cold. This, although less complicated, comes as near the object in view as the "gridiron."

Mr. Launy, an artist in New York, and formerly distinguished in several cities of Eu-

rope, is said to have discovered a full and complete corrective of the defects already mentioned. His invention is far less complicated than those of Harison and Le Paute. Several artists, who have examined it, have expressed the fullest confidence in its correctness and utility. It is a compensating pendulum, and is expected to perform its office without any alteration from the effects of the weather, in the greatest extremes; and may be accommodated to any well-made clock, so as to convert it into an astronomical timepiece.

THE USE OF PARCHMENT.

Parchment, used for writing, is prepared from the skins of sheep and goats. These, after being steeped in pits impregnated with lime, are stretched upon frames, and reduced by scraping and paring with sharp instruments. Pulverized chalk is rubbed on with a pumice stone resembling a muller, which smooths and softens the skin, and improves its color. After it is reduced to something less than half its original thickness, it is smoothed and dried for use. Vellum is a similar substance to parchment, made from the skins of very young calves.

Next to the papyrus, the skins of animals, in the form of parchment and vellum, were extensively used for writing by the ancients

from a remote period. When Eumenes, or Attalus, attempted to found a library at Pergamus, 200 years B. C., which should rival the famous Alexandrian library, one of the Ptolemies, then king of Egypt, jealous of his success, made a decree prohibiting the exportation of papyrus. The inhabitants of Pergamus set about manufacturing parchment as a substitute, and formed their library principally of manuscripts on this material, whence it was known among the Latins by the name of Pergamena.

The term membrana was also applied by them to parchment. The Hebrews had books written on the skins of animals in David's time ; and Herodotus relates that the Ionians, from the earliest period, wrote upon goat and sheep skin, from which the hair had merely been scraped off. These facts show that parchment was not invented at Pergamus, but it was much improved there, and first made in large quantities as an article of trade. Parchment was at first yellow ; it was afterwards made white in Rome. At present any color can be given to it.

THE ART OF DYEING.

The origin of the art of dyeing is involved in that obscurity which pervades the history of all those arts connected with the common

wants and necessities of life. They have originated in times beyond the reach of history or tradition, and are the offspring of the natural faculties of man directed by the great primeval wants of food, shelter, and raiment. The art of dyeing is, of course, posterior to many of these, and is founded less on the necessities than passions of mankind. A love of distinction is common to man in every stage of civilization, but that passion for admiration which is displayed in a love of finery and ornament, is peculiar to him in his most barbarous and uncultivated state.

Hence savage nations delight in brilliant and gaudy colors, and many paint their skins, and adorn themselves with feathers, stones, and shells of various hues. History has not furnished us even with her fables on the origin of dyeing; but from analogy, as well as observation of the practice of barbarous nations at the present day, we may trace the rude beginnings from whence the art has sprung. The rich and gaudy plumage of birds, the finely-spotted skins of animals, colored stones, and such other substances as nature herself supplies, would afford the first materials for savage finery and dress. The caps and mantles of the chiefs of the South Sea Islands, such as were brought home by Captain Cook, are composed almost wholly of feathers richly colored.

The color which appears to have been earliest brought to perfection, and which was

held in such high estimation among the ancients, is purple. It was to chance alone, according to the tradition of antiquity, that they owed this discovery. A shepherd's dog, instigated by hunger, having broken a shell on the sea-shore, his mouth became stained with such a color as excited the admiration of all who saw it. They endeavored to apply it to stuffs, and succeeded.

There is some discordance in the details of the ancient writers of the circumstances of this event. Some place this discovery in the reign of Phœnix, second king of Tyre, that is to say, a little more than 500 years before Christ; others, at the time that Minos the First reigned in Crete, about 1439 years before the Christian era. But the greatest number agree in giving the honor of the invention of dyeing purple stuffs to the Tyrian Hercules. He gave his first trials to the king of Phœnicia, who was so jealous of the beauty of this new color, that he forbade the use of it to all his subjects, reserving it for the garments of royalty alone.

Some authors relate the story differently. Hercules' dog having stained his mouth with a shell which he had broken on the sea-shore, Tyras, a nymph of whom Hercules was enamored, was so charmed with the beauty of the color, that she declared to her lover she would see him no more till he brought her a suit dyed the same. Hercules thought of a way to satisfy his mistress; he collected a

great number of the shells, and succeeded in staining a robe of the color the nymph had demanded.

Such are the different traditions handed down by the ancients of the origin of the purple dye. They are evidently blended with fiction, yet they may serve to fix the epoch of this discovery, which appears to have been made about fifteen centuries before the Christian era. Whether the purple of Tyre was similar to that mentioned in holy writ, as used by Moses for the vestments of the high priest, and the ornaments of the tabernacle, may admit of some dispute, since it is not certain, according to M. Huet, that the word *argaman*, of the Hebrew text, which all the interpreters translate by *purpura*, means in reality that color.

The testimony of Homer confirms the antiquity of this discovery. This great poet and accurate observer, ascribes to the heroes of that age, in which we have supposed it became known, ornaments and cloths of purple.

The ancients had such an esteem for this color, that it was especially consecrated to the service of the Deity. Moses, as we have just observed, used stuffs of purple for the works of the tabernacle, and the habits of the high priest. The Babylonians gave purple habits to their idols; it was the same with most of the other people of antiquity. The pagans were even persuaded that the purple dye had

a particular virtue, and was capable of appeasing the wrath of the gods.

Purple was also the distinguishing mark of the greatest dignities from the earliest times. We have seen that the king of Phœnicia, to whom tradition says the first essays of this color were presented, had it reserved for the sovereign. Among the presents which the Israelites made to Gideon, the scripture makes mention of purple habits found among the spoils of the kings of Midian. Homer gives us plainly to understand, that it only belonged to princes to wear this color, and we may remark, that this custom was observed by all the nations of antiquity.

It is not easy to give a clear and precise idea of the process followed by the ancients in the production of this highly valued color. We find some details in the works of Aristotle and Pliny, in whose days the practice was very common, but they are not sufficiently circumstantial. The purple dye, according to Pliny, was drawn from many species of shell-fish. The best were found near the isle where New Tyre was built. They fished for them in other parts of the Mediterranean. The coasts of Africa were famous for the purple of Getulia. The coasts of Europe supplied the purple of Laconia, which was held in great esteem.

The purple has been almost everywhere a mark of distinction attached to high birth and dignity. It was an ornament of the first officers

of Rome; but luxury, which was carried to great excess in that capital of the world, rendered the use of it common among the opulent, till the emperors reserved to themselves the right of wearing it. Soon afterwards it became the symbol of their inauguration. They appointed officers to superintend the manufactories, principally established in Phœnicia, where it was prepared solely for their use. The punishment of death was decreed against all who should have the audacity to wear it, though covered with another color. The penalty so tyrannically denounced against this whimsical species of treason, doubtless occasioned the loss of the art of dyeing purple; first in the west, but much later in the east, where it flourished considerably till the eleventh century.

It appears that some kinds of purple preserved their color for a very long time. Plutarch, in his Life of Alexander, relates that the Greeks found in the treasury of the king of Persia a great quantity of purple which had not lost its beauty though it was 190 years old.

CURIOUS AUTOMATONS.

It is said that Archytas of Tarentum, 400 years before Christ, made a wooden pigeon that could fly; that Archimedes also made such automatons; that Regiomontanus made

a wooden eagle that flew forth from the city, met the emperor, saluted him, and returned; also, that he made an iron fly, which flew out of his hand at a feast, and returned again after flying about the room. That Dr. Hook made the model of a flying chariot, capable of supporting itself in the air.

Many other automatons have been exhibited in the present age, some of which we shall describe hereafter. Some figures have been formed that could write, and perform many other actions in imitation of animals. M. Vaucanson made a figure that played on the flute; the same gentleman also made a duck which was capable of eating, drinking, and imitating exactly the voice of a natural one; and, what is still more surprising, the food it swallowed was evacuated in a digested state, or considerably altered in the principles of solution; also the wings, viscera, and bones, were formed so as strongly to resemble those of a living duck, and the actions of eating and drinking showed the strongest resemblance, even to the muddling the water with its bill.

M. Le Droz, of *La Chaux de Fonds*, in the province of Neufchatel, has also executed some very curious pieces of mechanism; one was a clock, presented to the king of Spain, which had, among other curiosities, a sheep that imitated the bleating of a natural one; and a dog watching a basket of fruit, that barked and snarled when any one offered to take it away;

besides a variety of human figures, exhibiting motions truly surprising.

Another automaton of Droz's was the figure of a man, about the natural size, which held in the hand a metal style, and, by touching a spring that released the internal clock-work from its stop, the figure began to draw on a card; and, having finished its drawings on the first card, the figure rested, and then proceeded to draw different subjects on five or six other cards. The first card exhibited elegant portraits of the king and queen, facing each other; and the figure was observed to lift its pencil with the greatest precision, in the transition from one point to another, without making the least slur.

AUTOMATON CHESS-PLAYER.

This astonishing piece of mechanism was the invention of Wolfgang de Kempelen, an Hungarian gentleman, and aulic counsellor to the royal chamber of the domains of the emperor in Hungary, in 1769.

The room where it is exhibited has an inner apartment, in which appears the figure of a Turk, as large as life, dressed after the Turkish fashion, sitting behind a chest of three feet and a half in length, two feet in breadth, and two feet and a half in height, to which it is attached by the wooden seat on which it sits.

The chest is placed upon four castors, and together with the figure, may be easily moved to any part of the room. On the plane surface, formed by the top of the chest, in the centre, is raised an immoveable chess-board of handsome dimensions, upon which the figure has its eyes fixed; its right arm and hand being extended on the chest, and its left arm somewhat raised, as if in the attitude of holding a Turkish pipe, which was originally placed in his hands.

The exhibiter begins by wheeling the chest to the entrance of the apartment within which it stands, and in face of the spectators. He then opens certain doors contrived in the chest, two in front and two at the back, at the same time pulling out a long shallow drawer at the bottom of the chest, made to contain the chessmen, a cushion for the arm of the figure to rest upon, and some counters. Two lesser doors, and a green cloth screen, contrived in the body of the figure and its lower parts, are likewise opened, and the Turkish robe which covers them is raised; so that the construction both of the figure and chest internally is displayed.

In this state the automaton is moved round for the examination of the spectators; and to banish all suspicion from the most skeptical mind, that any living subject is concealed within any part of it, the exhibiter introduces a lighted candle into the body of the chest

and figure, by which the interior of each is, in a great measure, rendered transparent, and the most secret corner is shown. Here it may be observed, that the same precaution to remove suspicion is used, if requested, at the close as at the commencement of a game at chess with the automaton.

The chest is divided by a partition into two unequal chambers. That to the right of the figure is the narrowest, and occupies scarcely one-third of the body of the chest. It is filled with little wheels, levers, cylinders, and other machinery used in clock-work. That to the left contains a few wheels, some small barrels with springs, and two quarters of a circle placed horizontally. The body and lower parts of the figure contain tubes, which seem to be conductors to the machinery. After a sufficient time, during which each spectator may satisfy his scruples and his curiosity, the exhibiter recloses the doors of the chest and figure, and the drawer at bottom, makes some arrangements in the body of the figure, winds up the works with a key inserted into a small opening on the side of the chest, places a cushion under the left arm of the figure, which now rests upon it, and invites any individual present to play a game of chess.

In playing a game the automaton makes choice of the white pieces, and always has the first move. These are small advantages towards winning the game, which are cheerfully

conceded. It plays with the left hand, the right arm and hand being constantly extended on the chest, behind which it is seated. This slight incongruity proceeded from absence of mind in the inventor, who did not perceive his mistake till the machinery of the automaton was too far completed to admit of the mistake being rectified.

At the commencement of a game, the automaton moves its head, as if taking a view of the board; the same motion occurs at the close of a game. In making a move, it slowly raises its left arm from the cushion placed under it, and directs it towards the square of the piece to be moved. Its hand and fingers open on touching the piece, which it takes up, and conveys to any proposed square. The arm then returns with a natural motion to the cushion, upon which it usually rests. In taking a piece the automaton makes the same motions of the arm and hand to lay hold of the piece, which it conveys from the board; and then returning to its own piece, it takes it up, and places it on the vacant square. These motions are performed with perfect correctness; and the dexterity with which the arm acts, especially in the different operation of castling, seems to be the result of spontaneous feeling, bending of the shoulder, elbow, and knuckles, and cautiously avoiding to touch any other piece than that which is to be moved, nor ever making a false move.

After a move made by its antagonist, the automaton remains for a few moments only inactive, as if meditating its next move; upon which the motions of the left arm and hand follow. On giving check to the king, it moves its head as a signal. When a false move is made by its antagonist, which frequently occurs through curiosity, to observe in what manner the automaton will act, (as, for instance, if a knight be made to move like a castle,) the automaton taps impatiently on the chest with its right hand, replaces the knight on its former square, and, not permitting its antagonist to recover his move, proceeds immediately to move one of its own pieces; thus appearing to punish him for his inattention. The little advantage in play which is hereby gained, makes the automaton more than a match for its antagonist; and seems to have been contemplated by the inventor as an additional resource towards winning the game.

It is of importance that the person matched against the automaton should be attentive in moving a piece, to place it precisely in the centre of the square, otherwise the figure, in attempting to lay hold of the piece, may miss its hold, or even sustain some injury in the delicate mechanism of the fingers. When the person has made a move, no alteration in it can take place; and if a piece be touched it must be played somewhere. This rule is strictly observed by the automaton. If its an-

tagonist hesitates to move for a considerable time, it taps smartly on the top of the chest with the right hand, which is constantly extended upon it, as if testifying impatience at his delay.

During the time that the automaton is in motion, a low sound of clock-work running down is heard, which ceases soon after its arm returns to the cushion; and then its antagonist may make his move. The works are wound up at intervals, after ten or twelve moves, by the exhibiter, who is usually employed in walking up and down the apartment in which the automaton is shown; approaching, however, the chest from time to time, especially on its right side.

AUTOMATON MUSICIANS.

One of the most celebrated modern constructors of androides was M. Vaucanson, of the *Académie Royale des Sciences.* In 1738, he exhibited at Paris a machine capable of playing several airs on the German flute, of which he, in the same year, communicated an exact description and explanation to the academy, containing much curious information respecting the theory, as well as the practice, of that musical instrument.

This machine was a figure about five feet and a half in height, situated on the fragment

of a rock, fixed upon a square pedestal, four feet and a half high, by three and a half broad. The front of the pedestal being opened, a clock-work movement was seen, by means of which a steel axis was made to revolve, having various protuberances upon it, to which were attached cords thrown over pulleys, and terminating in the upper boards of nine pairs of bellows, which were thus alternately raised and let down by the revolution of the axis.

The disagreeable fluttering noise produced by the wind forcing open the valves of the bellows, was prevented by causing the valves to open by means of levers, which were acted upon by the tightening of the ropes which raised the upper boards of the bellows, and which, therefore, kept the valve open till the boards were allowed to descend. The nine pairs of bellows discharged their air into three different tubes, which ascending through the body of the figure, terminated in three small reservoirs in its trunk; these they united into one, which ascending to the throat formed the cavity of the mouth. To each of the three pipes three pairs of bellows were attached. The upper boards of one set were pressed down with a weight of four pounds, those of the second set by a weight of two pounds, and those of the third by their own weight only.

Such were the expedients for supplying air to the flute-player: another piece of clock-work contained within the pedestal, was for

the purpose of communicating the proper motions to his fingers, his lips, and his tongue. By this movement a cylinder was made to revolve, two feet and a half long, and sixty-four inches in circumference, which was divided into fifteen equal parts, of an inch and a half each. In these divisions were inserted various pegs and staples of brass, which raised and depressed the ends of fifteen different levers, similar to those which produce the sounds of a common barrel organ.

Seven of these levers regulated the motions of the seven fingers required to stop the holes of a German flute, with which they communicated by means of steel chains ascending through the body of the figure, and directed by means of pulleys into the proper angles at the shoulder, elbow, &c. Three of the levers regulated the ingress of the air, being connected with the valves of the three reservoirs in the body of the figure, which they opened and shut at pleasure, so as to produce a stronger or weaker, a louder or lower tone.

By a similar contrivance, four of the levers served to give the proper motions to the lips, so as to allow a freer passage to the air; another contracted them, so as to diminish the efflux of air; the third drew them backward from the orifice of the flute, and the fourth pushed them forward. The remaining lever was employed in the direction of the tongue, to which it gave motion, in such a manner as

to open and shut the mouth of the flute at pleasure.

This mechanism, with other ingenious contrivances, enabled M. Vaucanson to produce all the motions requisite for an expert player on the flute, and which he executed in such a manner as to produce music equal in beauty to that derived from the exertions of a well-practised living performer. The same gentleman afterwards exercised his ingenuity in the construction of another musical androides, exhibited to the academy in 1741, and which was not less admired than his flute-player.

This was a mechanical performer on the pipe and tabor, fixed, like the flute-player, on a pedestal, habited like a dancing shepherd, and capable of playing about twenty airs, consisting of minuets, rigadoons, and country-dances.

AUTOMATON SEATED AT A PIANO-FORTE.

Among the most celebrated automatical mechanics of the present day is M. Maillardet, a native of Switzerland, who has constructed several androides of unrivalled excellence. One of these represents a beautiful female seated at a piano-forte, on which she performs eighteen tunes. Independent of the expression of the music which is produced by the actual pressure of her fingers on the keys, all her

motions are elegant and graceful, and so nearly imitating life, that, even on a near approach, the deception can hardly be discovered.

Before commencing a tune, she makes a gentle inclination with her head, as if saluting the auditors; and remains seemingly intent on the performance. Her bosom heaves, her eyes move, and appear as naturally to follow her fingers over the keys, as if it were real animation. The hands regulate the natural tones only, for the flats and sharps are played by pedals, on which the feet operate. It is likewise to be observed, that although the instrument resembles a piano-forte, it is in fact an organ, the bellows of which are blown by particular parts of the machinery.

The movements of this figure are effected by means of six large springs, which, when completely wound up, will preserve their action during an hour. The various parts composing the machinery are extremely nice and complicated, and all admirably adapted to the purposes required. Twenty-five leaders, or communications, produce the different motions of the body, and others, proceeding from the centre of motion, are distributed to the different parts of the instrument. A brass fly regulates and equalizes the whole. The figure is so contrived for the convenience of removal, that it divides in the middle. It is enclosed in a large glass case, and rests above a mahogany box containing the machinery, which the

artist throws open for universal inspection. It was valued by him at fifteen hundred or two thousand pounds, which may in some respect prove the extent of the labor and ingenuity in framing it.

AUTOMATON COACH AND HORSES.

Another extraordinary piece of mechanism is that described by M. Camus, who says he constructed it for the amusement of Louis XIV., when a child. It consisted of a small coach drawn by two horses, in which was the figure of a lady, with a footman and page behind. According to the account given by M. Camus himself, this coach being placed at the extremity of a table of a determinate size, the coachman smacked his whip, and the horses immediately set out, moving their legs in a natural manner.

When the carriage reached the edge of the table, it turned at a right angle, and proceeded along that edge. When it arrived opposite to the place where the king was seated, it stopped, and the page getting down opened the door, upon which the lady alighted, having in her hand a petition, which she presented with a curtsey. After waiting some time, she again curtsied, and re-entered the carriage; the page then resumed his place, the coachman whipped his horses, which began to move, and the foot-

man, running after the carriage, jumped up behind it, and the carriage drove on.

AUTOMATON SINGING BIRD.

M. Maillardet, an artist whom we have before mentioned, constructed an oval box, about three inches in length; the lid flew up, and a bird of beautiful plumage, not larger than a small humming-bird, started up from its nest. Its wings fluttered, and its bill opening with the tremulous vibration peculiar to singing birds, it began to warble. After continuing a succession of notes, which would fill a large apartment, it darted down into its nest, and the lid closed of itself.

The machinery was here contained in a very narrow compass, and could produce four different kinds of warbling: it was put in motion by springs, which preserved their action during four minutes. It has often created great surprise, how such a variety of notes could be produced within a space where there was evidently no room for a corresponding number of pipes. The artist, however, has accomplished his purpose by a very simple expedient. There is only one tube, the vacuity of which is shortened or lengthened by a piston working inside, and thus producing sounds graver or more acute, according as the machinery operates upon it.

ST. PETER'S CHURCH AT ROME.

The cathedral church of St. Peter's, at Rome, is esteemed a master-piece of modern architecture, and strikes the spectator with admiration and pleasing astonishment. The circular area which lies before this magnificent edifice, is encompassed by a beautiful peristyle or colonnade, consisting of 284 marble pillars of the Doric order, which support an architrave, adorned with a vast number of statues of saints and martyrs. The obelisk already mentioned, and a fine fountain on each side of it, are great additions to the beauty of this spacious court, from whence there is a flight of steps to a grand terrace, that leads into the lofty portico before the church.

Over this portico, which is supported by pillars 18 feet in circumference, are the statues of our Saviour and the twelve apostles; and there is also a fine balcony, where the popes are crowned, in view of all the people. The body of the church, as well as the cupola, which is adorned with curious mosaic work, is sustained by large square pillars, like those of St. Paul's cathedral in London; and under the middle of the cupola stands the high altar, which is 90 feet in height, being a kind of pavilion, supported by four wreathed columns of brass, adorned with foliage; and on the top of the canopy are four angels of gilt brass, holding festoons of flowers, most beautifully carved;

and between them are figures of children playing on the cornice.

The ascent to the dome is by a winding staircase, and from thence to the ball, by an incommodious flight of stairs, which lies between the outer and inner dome. The height from the pavement to the top of the cross is 432 feet, and the diameter of the ball is 80 feet 4 inches. St. Peter's chair is made of gilded brass, and supported by four gigantic figures, representing four fathers of the church, with a glory over them, extending quite to the roof. Under this chair is an altar, and on each side are stately monuments of brass and marble, of excellent workmanship.

It is scarcely possible to describe the riches and beauty of the little chapels and altars round this church; yet the gilding, carving, paintings, embossed work, brass and marble statues, &c., are so well contrived and disposed, that the abundance occasions not the least confusion, nor does any thing appear superfluous. But among all the ornaments of this cathedral, none deserves our attention more than the mosaic pictures which represent several pieces of scriptural and ecclesiastical history, and exceed any thing of that kind that was ever done by the ancients.

Here it may be proper to inform the reader, that mosaic work is an assemblage of little pieces of glass, marble, or precious stones, of various colors, cut square, and cemented on a

ground of plaster, imitating the natural colors and gradations of painting. In this sense, it includes inlaid work, veneering, &c.; but in its more proper and restrained sense, it only comprehends works of stone, metals, and glass, those of wood being distinguished by the name of marquetry.

The mosaic of marble, which at present is most in use, serves for the pavements of churches and palaces, and the incrustations of the walls of the same edifices; but that of precious stones is so expensive, that it is seldom used unless in small works, such as ornaments for altar-pieces, rich tables, &c. The mosaic work so much admired in St. Peter's is done with colored glass, which kind, though now but little used, is extremely brilliant and durable. It is laid on a sort of plaster, composed of lime, fine brick-dust, gum tragacanth, the white of eggs, and other ingredients; the pieces of glass being arranged with so much justness, and the light and shadow so well observed, that they appear as smooth as a table of marble, and as highly finished as a painting in fresco, with this advantage, that they have a fine lustre, and will last almost forever, whereas time effaces all other kinds of painting.

There is another sort of mosaic work, of a more modern invention than any of the former, made with a kind of gypsum or talc, found in the stone quarries near Paris. Of this talc,

calcined in a kiln, beaten in a mortar, and sifted, they form a sort of artificial marbles, imitating precious stones, and of these compose a mosaic work, little inferior to the natural stones, either in point of lustre or durability.

Mr. Smollet, speaking of this church, in his travels through Italy, says, the Piazza is altogether sublime. The double colonnade on each side extending in a semicircular sweep, the stupendous Egyptian obelisk, the two fountains, the portico, and the admirable façade of the church, form such an assemblage of magnificent objects as cannot fail to impress the mind with awe and admiration; but the church would have produced a still greater effect, had it been detached entirely from the buildings of the Vatican. It would then have been a master-piece of architecture, complete in all its parts, entire and perfect; whereas at present, it is no more than a beautiful member attached to a vast, undigested, and irregular pile of building. The great picture of mosaic work, and that of St. Peter's bark, tossed by the tempest, which appear over the gate of the church, though rude in comparison with modern pieces, are nevertheless great curiosities, when considered as the work of Giotto.

The tribune of the great altar, consisting of four wreathed brass pillars, gilt, supporting a canopy, is doubtless very magnificent, but rather overcharged with sculpture, fluting, foliage, festoons, and figures of boys and angels,

which, with the hundred and twenty-two lamps of silver continually burning below, serve to dazzle the eyes, and kindle the devotion of the ignorant vulgar, rather than to excite the admiration of a judicious observer.

There is nothing, however, in this famous structure so worthy of applause as the admirable symmetry and proportion of its parts. Notwithstanding all the carving, gilding, basso-relievos, medallions, urns, statues, columns, and pictures, with which it abounds, it does not, on the whole, appear over-crowded with ornaments. When you first enter, your eye is filled so equally and regularly, that nothing appears stupendous, and the church seems considerably smaller than it really is.

The statues of children, that support the fonts of holy-water, when observed from the door, seem to be of the natural size; but as you draw near, you perceive they are gigantic. In the same manner, the figures of the doves, with olive-branches in their beaks, which are represented on the wall, appear to be within your reach; but as you approach them, they recede to a considerable height, as if they had flown upwards to avoid being taken.

ST. PAUL'S CHURCH, LONDON.

This magnificent cathedral, one of the finest Protestant churches in the world, built in the

purest style of Grecian architecture, stands upon an eminence to the north of the river Thames. The first stone was laid by Sir Christopher Wren, on the 21st of June, 1675, in the reign of King Charles II.; the design was completed in 1710, but the decorations were not finished till the year 1723.

This cathedral is built of fine Portland stone, after the model of St. Peter's at Rome; having two ranges of pilasters on the outside, one above another, the lower range of the Corinthian order, and the upper of the composite. The spaces between the arches of the windows, and the architecture of the pilasters, are filled up with various decorations.

The west front is beautified with a most magnificent portico, supported by twelve massy columns of the Corinthian order, and over those are eight composite columns, supporting a beautiful pediment, in which the history of St. Paul's conversion is cut in bas-relief. The ascent to this portico is by a flight of black marble steps; and over each corner of this front is an elegant turret. On the south side of the church is a portico with a dome, supported by six columns, and on the pediment is a phœnix in flames, with the word *resurgam* carved underneath it. The north portico corresponds with that on the south, and its pediment is embellished with the royal arms and other ornaments.

In the centre of the building rises a stupen-

dous dome or cupola; and about twenty-five feet above the roof of the church is a circular range of columns, terminated by an entablature which supports a handsome gallery, adorned with a stone balustrade. On the summit of the dome is an elegant balcony, from which rises a beautiful lantern, adorned with Corinthian columns, and the whole is terminaed by a gilt ball and cross.

On the inside, the cupola is supported by eight stupendous pillars curiously adorned; the roof of the choir is supported by six pillars, and the roof of the church by two ranges, consisting of twenty more.

Round the inside of the cupola runs a handsome iron gallery, where a whisper or even the ticking of a watch may be heard distinctly at the distance of a hundred feet.

The top of the dome is finely painted by Sir James Thornhill; the floor of the choir is paved with marble, and the altar is adorned with four pilasters, painted and veined with gold, in imitation of *lapis lazuli*.

The length of this cathedral from east to west, including the portico, is 500 feet; its breadth, including the north and south porticoes, 311; and its height, from the ground to the top of the cross, is 344 feet.

This pile of building occupies an area of six acres, and is railed round with an iron balustrade, which is said to have weighed nearly three hundred tons, and to have cost upwards

of 11,000*l.* The whole expense of building the cathedral amounted to 736,752*l.* 2*s.* 3*d.*

The clock-works are well deserving the attention of the curious. The fine-toned bell which strikes the hours, is clearly distinguishable from any other in the metropolis, and has been distinctly heard at the distance of 20 miles. The weight of the bell is 11,474 pounds. The clock-dial is 57 feet in circumference. The length of the minute-hand is eight feet. A model of the latter is kept in the gallery leading to the library, for the inspection of the curious.

WESTMINSTER ABBEY.

One of the noblest specimens of Gothic architecture in England, is the Abbey of St. Peter at Westminster, so called from having been the church of a convent dedicated to St. Peter, which was destroyed by the Danes about the year 850. It was rebuilt by King Edgar, and enlarged by Edward the Confessor; but the present magnificent edifice was erected during the reign of Henry III. On the dissolution in 1539, this great monastery underwent the common fate of the religious houses; and the abbot, William Benson, having subscribed to the king's supremacy, was rewarded with the office of first dean to the new foundation, consisting of a dean and 12 prebendaries. In

1560 it was changed into a collegiate church, consisting of a dean and 12 secular canons, and other members; 2 schoolmasters, 40 scholars, 12 almoners, and several officers and servants.

The form of this church is that of a long cross; its length is 489 feet; the breadth of the west end 66; that of the cross aisle 189; and the height of the middle roof about 92 feet. At the west end are two noble towers, built by Sir Christopher Wren; the nave and cross aisle are supported by 50 slender pillars of Sussex marble, about twelve and a half feet asunder, besides pilasters. There are 94 windows in the upper and lower ranges, all of which, with the arches, roofs, and doors, are in the ancient Gothic style.

The interior of the church is admirably executed, and the perspectives very good, particularly that of the grand aisle. The new choir, which is the work of the late Mr. Keen, is executed in the ancient Gothic style, but the architect has so happily blended simplicity with ornament, as to produce the most pleasing effect. It has also this peculiar advantage, that it can, upon solemn occasions, be easily removed, and may be replaced without much trouble or expense. The altar is extremely beautiful.

The great west window, set up in the year 1735, is finely painted, with representations of Abraham, Isaac, and Jacob; the twelve

patriarchs; Moses and Aaron; and the coats of arms belonging to King Sebert, Edward the Confessor, Queen Elizabeth, George II., and Dean Wilcocks, Bishop of Rochester.

In a smaller window on the right, is a figure supposed to be that of Edward the Black Prince, and on the opposite is another, which is conjectured to represent Richard II., but the colors being of a water blue, the features cannot be particularly distinguished. The three windows at the east end contain figures of St. John the Evangelist, Militus, Bishop of London, and two pilgrims; and the beautiful north window, which was put up in 1722, represents our Saviour, with his twelve apostles and the four Evangelists.

In this venerable structure are 12 sepulchral chapels, containing several curious monuments of the sovereigns and nobility of Great Britain: a few of the most remarkable are inserted in this work for the entertainment of our readers.

The chapel of Henry VII. is situated to the east of the abbey, and is, in point of elegance, nearly the rival of that at King's College, Cambridge. The royal founder expended £14,000 on this building, which he expressly designed as the mausoleum of himself and his descendants. The ascent to the interior of this chapel is from the east end of the abbey, by steps of black marble leading to the gates, which are of brass, most curiously wrought in

the manner of frame-work, having a rose and portcullis alternately on every other panel.

On the first entrance the eye is naturally directed to the roof, which is divided into sixteen circles of curious workmanship, and supported by 12 stately pillars, enriched with figures, fruitage, and other ornaments. The stalls are of brown wainscot, with Gothic canopies, and the arms and banners of the knights produce a fine effect. There are many statues in niches; and in the body of the chapel is the superb tomb of the royal founder and his queen, with their figures recumbent in brass. Here also are some elegant monuments erected to the memory of Margaret, Countess of Richmond, Queen Elizabeth, the unfortunate Mary Stuart, and several other illustrious personages.

Between the knights' stalls, under a broad marble pavement, is the royal vault, where repose the bodies of James I., William III., Anne, and George II. The length of this chapel is 99 feet, the breadth 66, and the height 54.

At the entrance of St. Edmund's Chapel is an alabaster statue of John of Eltham, second son of King Edward II.; his habit is that of an armed knight, and his head is encircled with a coronet of leaves. On a Grecian altar in the same chapel sits a statue of Lady Elizabeth Russel, who is commonly said to have lost her life by accidentally pricking her fingers. Here also are monuments to the me-

mories of Lady Jane Seymour, William de Valence, and Mary, Countess of Strafford, wife to the unfortunate Viscount, who suffered decapitation, in the reign of Charles I., on Tower Hill.

The chapel of St. Michael contains some of the finest monuments of Westminster Abbey. The tomb of Joseph Gascoigne Nightingale and his lady, is the work of M. Roubiliac, and is justly admired by all judges of merit. Above, is represented a lady expiring in the arms of her husband; beneath, slyly peeping from a tomb, the king of terrors presents his dreadful visage, and points his unerring dart at the sinking figure, while the distracted husband seems to clasp her to his bosom, and attempts to defend her from the fatal stroke.

Opposite to this beautiful monument, is that of the Earl and Countess of Monutrath, which is equally entitled to our admiration from the grandeur of the design, and the extraordinary lightness of the execution. On the summit, is a representation of the celestial mansions, and their blessed inhabitants; and on a sarcophagus beneath, is the figure of the countess, in the attitude of rising from the grave and supported by an angel, who, with his hand, points up to heaven, where a seat is prepared for her reception, and where another angel waits to crown her with a wreath of glory.

The chapel of St. Andrew contains monuments to the memory of several honorable per-

sonages; but the most elegant are those of Sir Henry Norris, famous for his gallant conduct in the Low Countries during the reign of Queen Elizabeth; and Susanna Jane Davidson, who is represented just expiring, Death having pierced her breast with his fatal dart; an angel supports the female figure, and appears to offer consolation by pointing to the joys of futurity.

The tombs in the area and aisles of the church are far too numerous to admit of description in a work of this nature. Suffice it, therefore, to say that, among the most celebrated, the spectator may recognise those of General Wolfe, the Earl of Mansfield, William Shakspeare, Matthew Prior, John Milton, James Thomson, Nicholas Rowe, John Gay, Oliver Goldsmith, Geoffrey Chaucer, George Frederick Handel, Sir Isaac Newton, and many others, who have acquired immortal reputation by the brilliancy of their genius, or the happy result of their extraordinary exertions.

THE IRON STEAM-SHIP, GREAT BRITAIN.

This splendid ship, the largest we believe in the world, is built entirely of iron, with the exception of the boarding of her decks and some of her cabin fittings and carved works. She has 26 state-rooms with one bed each,

and 113 with two, so that in addition to her officers and crew she can accommodate 252 passengers, each of whom can be provided with a single bed, and without making up a single sofa, or any other temporary inconvenience. The saloon is fitted with rows of dining-tables, of sufficient capacity to admit of 360 persons sitting down to dinner at one time, with perfect convenience and comfort. In the construction of the hull and engines, the enormous quantity of 1500 tons of iron have been used; and eight walks round the principal deck are about equal to a mile in length.

The arrival of this mammoth steam-ship at New York, has produced an interest corresponding with the magnitude of the enterprise. The triumphs of art, now applied through the power of steam, are supplanting the triumphs of war; and hastening, it is to be hoped, the period when the nations of the earth shall lay aside the implements of destruction for the implements of a liberal commerce, and a higher civilization. Commerce and the arts are uniting with Christianity, in the great work of human progress. It is with this view of the subject, that we hail every new achievement of art, every beneficent movement in the commercial world.

The Great Britain left Liverpool on the 26th July, 1845, at 4 o'clock, P. M. She encountered strong westerly winds and a heavy sea on her voyage, as well as fog during the last

five days, which compelled her to go slowly at times, and of course considerably retarded her progress. She reached the dock or wharf in New York on the 10th of August, after having stopped at quarantine ground, making an average of rather more than eight and a half knots or nautical miles per hour on the passage. The ship during the worst of the weather, says Capt. Hosken, behaved well, and gave promise of a good and safe sea boat, under the worst circumstances; her movements are all remarkably easy, whether pitching or rolling. The latter, Capt. Hosken is of opinion, will be very materially lessened by the application of ridge keels, intended to be put on next winter.

The Great Britain is the largest steam-ship in the world. The next in size is, we believe, the English ship "Precursor," of 2,500 tons, in India, which has been found to answer well. First-rate men of war are so different, as not to admit of a comparison; their size varies from 500 to 1,000 tons less than the Great Britain. The "Pennsylvania," built at Philadelphia, is the largest.

The Great Britain is divided into compartments, to each of which the engine-pumps, by the means of pipes and cocks, can be applied. The water-tight divisions of each compartment add greatly to the strength of the ship, either as struts or ties. All steamers, whether on the score of humanity, or for the preservation of property, ought to be so divided, for if

a vessel be divided into five or six compartments, and any one of them should from accident fill, her buoyancy would be slightly affected. If two compartments filled, and those two were not at the extremes, the extreme compartments would still keep her afloat. If two consecutive compartments, either forward or aft, filled, it is certain if she went down head or stern foremost that she would be some time about it,—long enough, probably, to give opportunity for all the boats to be got in readiness.

The celebrated Nemesis struck on the English Stones, in the British Channel, going nine or ten knots; she slid off, after making such a slit in a plate in the forward compartment as filled it. She steamed several hours with the compartment full, until she obtained additional pumps in Mount's Bay, with which the space was pumped out, and the leak stopped. At Portsmouth she was examined, and drawings of the damage were made by an employé of the company; she was repaired in a few hours, at an expense of about £30, and then started for China.

The Brigand, a large iron steamer, trading between Liverpool and Bristol, struck on sunken rocks off the Scilly Islands, filled a forward compartment, and had some part of her paddle-wheel forced so far into the engine-room, as to damage the plates, and fill that part also. She remained afloat, in consequence of the remaining compartments, long enough to enable the

crew to save themselves and their kits comfortably, and then went down in deep water. The Wye, trading between Bristol and Chepstow, was cut down more than a foot below the water-line by one of the Irish steamers, her stem having gone into the little Wye as far as the forward companion; she continued her voyage, and landed all her passengers as safely, but not quite as fast, as if nothing had happened; in her case, it was the foremost compartment that filled.

The Sylph, although a slight vessel, and of wood, had compartments; the two foremost filled, but the after one kept her long enough afloat to enable all who were not killed or injured to effect their escape. The case of the Vanguard iron steamer, which for ten days was exposed to heavy breakers, on the rocks in White's Bay, near Cork, may also be mentioned, both as a proof of the strength of iron, and of the value of compartments.

The length of the keel is 289 feet. Total length, 322 feet. Beam, 51 feet. Depth, 32 feet 6 inches. Feet of water when loaded, 16 feet. Displacement, 2,984 tons. Tonnage by old measurement, 3,443 tons. Plates of keel nearly 1 inch thick. Plates of bottom varying to $\frac{3}{4}$ of an inch at extremes, and to $\frac{5}{8}$ths generally. Topsides $\frac{1}{2}$ an inch, and at the extreme aft $\frac{7}{16}$ths. The ribs are framed of angle iron, 6 inches by $3\frac{1}{2}$ inches, $\frac{1}{2}$ inch thick, and $\frac{7}{16}$ths. Distance of ribs from centre to centre, amid-

ships, 14 inches, increasing to 21 inches at the ends.

Ten iron sleepers run from the engine-room, gradually diminishing in number to the fore-end of the ship and under the boilers, the platform of which they support; in midships they are 3 feet 3 inches in depth, supported by angle irons in the form of inverted arches, and a short distance from each other.

She has five water-tight partitions; stows 1,200 tons of coal—1,000 tons of measurement. The engines weigh 340 tons. The boilers 200 tons, and hold 2,000 tons of water. The main shaft is 28 inches in diameter in the centre, and 24 inches in the bearings; in the rough, before turned, it weighed 16 tons. It has been lightened by a hole of 10 inches diameter bored through. A stream of cold water passes through the cranks and this hole when the engines are at work.

The screw shaft is in one long and two short or coupling parts: the part next the engine, solid, 28 feet, by 16 inches diameter; the hollow intermediate shaft 65 feet, by 2 feet 8 inches diameter. The screw part is 25 feet 6 inches, and also 16 inches diameter. The total length is 130 feet, and it weighs altogether 38 tons. The screw is of six arms, 15 feet 6 inches diameter, 25 feet pitch, and weighs 4 tons.

The main drum is 18 feet diameter, and drives 4 chains, weighing 7 tons. The screw shaft drum is 6 feet diameter, and the weight

with the pull when working is equal to 85 tons on the bearings of the main shaft. The cylinders are 4 in number, 88 inches each. Stroke, 6 feet. Power, 1000 horses. The condensers are of wrought iron, 12 feet by 8, and 5 deep. Under the whole space of the engines up to the top, the angle irons are doubled. The upper, main, and saloon decks are of wood, the two cargo decks are of iron. The officers and seamen are all accommodated on two decks under the forecastle.

She has six masts, fitted with iron rigging, adopted in consequence of its offering two-thirds less resistance than hemp, a great point going head to wind. It was wished that five should have been the complement, but there was some difficulty in adjusting that number, and the alternative was either four or six. Economy of labor is a principle which has, in a great degree, affected the mode of rigging both the Great Western and the Great Britain. Nothing is so difficult to handle, under a variety of circumstances, as the sails of a steamer, unless the engine be stopped, which can never be allowed in Atlantic steaming, where onward—and for ever onward—is the rule. The greater the number of masts, the more handy the sails, and the smaller the number of seamen required to handle them.

If these ships had been rigged as ships ordinarily are, the former would require a crew of more than 100 seamen, and the latter that of

a large frigate. Divided, as the canvass is, and reduced, the former only requires 20 seamen before the mast, while thirty are enough for the latter. In the Great Britain there is in fact but one sail, the square mainsail, which, under any circumstances, can require all hands to furl it. Five masts of the six are hinged for lowering, when, in the captain's judgment, contrary gales shall appear to have set in, as the westerlies do at certain seasons of the year, prevailing for months in the Atlantic. To a seaman's eye they have a look of insecurity; but if the strain which a fixed mast will stand is compensated by additional shrouding and stays, either in strength or quantity, the same end is attained. The after masts could not be stepped in the ordinary manner, on account of the space occupied by the screw shaft. In theory, the principle of lowering is evidently right, because a steam-ship's masts and rigging, going head to wind, offer more resistance than the hull out of water, and there seems no reason to fear the result of practice.

The displacement of the Great Britain is less than 3,000 tons when loaded, and with 1,200 tons of coal on board; while the displacement of a first-rate, with all stores on board, is better than 4,500 tons, although the former is more than a third the longer ship.

The Great Britain, unless disabled in her machinery, will not use her canvass with a fair wind, unless it blows from a little gale up

to a hurricane; all her sails, except the square and gaff-topsails, being really double thread No. 1 canvass, or storm sails.

The plain sails of a fifty-two-gun frigate, that is, without counting royals, staysails, and steering sails, number something short of 5,000 yards of canvass, and the plain sails, that is, omitting the steering sails, etc., of the Great Britain, amount to 4,943 yards; or in other words, they are alike in quantity. There are more points of sailing in which the centre of effort of the frigate's or square-rigged ship's canvass will tell better, but there are some in which the low canvass of the steamer will have the advantage, and no steamer has any business with lofty spars or flying kites. If circumstances should bring the Great Britain to canvass alone, as her motive power, she will do as well or better than her neighbors, although the screw will stop her way perhaps fifteen per cent. In such an emergency the captain would disconnect it, and it would revolve then in the proportion due to the ship's way, or not impede her as if it were a fixture.

She carries four large life-boats of iron, and two boats of wood, in the davits, and one large life-boat on deck; they are built according to a patent, taken out by Mr. Guppy, and are capable of carrying 400 people.—*Merchants' Magazine.*

HERSCHEL'S GRAND TELESCOPE.

To lead to a clearer comprehension of the principle on which the telescopes of Dr. Herschel are constructed, it is necessary to advert to those of Newton and Gregory. The former of these consists of a tube, towards the end of which a concave mirror is placed. The converging rays, before they reach the focus, are made to fall on a plane mirror, placed at an angle of forty-five degrees, and thrown upward to the focus of a convex lens, fixed in the upper side of the telescope, through which the eye looks down on the object. The latter consists of a tube, on which a concave mirror, having a hole in its centre, is placed. Any parallel rays from an object falling on this mirror, will, after reflection, form an inverted image at its focus. This image, however, is intercepted by a smaller mirror, which reflects it back to an eye-glass in the hole of the large mirror, through which the observer views the object.

In the telescopes made by Dr. Herschel, the object is reflected by a mirror, as in the Gregorian telescope, and the rays are intercepted by a lens at a proper distance, so that the observer has his back to the object, and looks through the lens at the mirror. The magnifying power is the same as in the Newtonian telescope; but there not being any second reflector, the brightness of the object viewed in

the Herschel telescope, is greater than that in the Newtonian telescope.

The tube of Dr. Herschel's grand telescope is 39 feet 4 inches in length, and 4 feet 10 inches in diameter, every part being made of iron. The concave polished surface of the great mirror is 4 feet in diameter, its thickness three and a half inches, and its weight upwards of 2000 pounds. This noble instrument was, in all its parts, constructed under the sole direction of Dr. Herschel: it was begun in the year 1785, and completed August 28th, 1789, on which day was discovered the sixth satellite of Saturn. It magnifies *six thousand times.*

FORTRESS OF GIBRALTAR.

This impregnable fortress, belonging to Great Britain, is situated upon a tongue of land, at the southern extremity of Europe, on the north side of the narrow sea which forms a communication between the Mediterranean and the Atlantic, called the Straits of Gibraltar. A fortified line is drawn by the Spaniards from sea to sea, to cut off the communication of the garrison with the rest of Spain. The length of Gibraltar, from the lines on the Spanish side, to the most southern part, called *Europa point*, is about three English miles, and the circumference seven.

On the west side stands the town of Gibraltar, on the water side, and is defended by a line of ramparts, forming a continued fortification from the north and perpendicular side of the rock, to the extremity of the Moors' wall, which nearly divides the rock into two equal parts. This wall was built about the year one thousand, and runs from the water-side about one-third of the way up with a very rapid ascent, till it meets an inaccessible part of the rock, where it was discontinued, and another built farther to the south at an accessible place. The fortifications have since been continued round the rock, and rendered impregnable by works cut into the interior on the north and eastern side, where it is perpendicular.

The English, since they became masters of this place, have been indefatigable in excavating the rock, and forming subterraneous walks, 5000 feet in length, galleries and caverns, into which the besieged might retreat during an attack, in case the outer works should be carried by an enemy. These galleries form several tiers or ranks (23 in number) of batteries, from 300 to 1300 feet above the surface of the flat country below, called the *neutral ground*, which is between the Spanish and English lines. Were a general battering of all the embrasures to take place at the same time, it would afford one of the grandest spectacles in the world. It would resemble a huge monster,

with a thousand mouths, each vomiting out thunder, smoke, and red-hot balls.

The cannon have all been so well practised, and are so well elevated, that the object aimed at is hit with as much certainty as with a fusee. The whole surface of the rock, outside, is planted with cannon, in every place where it is possible to make an attack, even with one or two men only at a time. Should the water lines be carried by an enemy, they would have to dispute the ascent to the top of the mountain, inch by inch, and in many places, by narrow passes, between stupendous rocks, which are not more than 25 or 30 feet wide. Should they even succeed and obtain possession of the whole surface of the mountain, they would have to combat with an army in the bowels of the rock, against a thousand mines and other artifices, which would render the situation of the conquerors very unsafe. It is said there are close quarters in the rocks for more than twelve thousand men, and provisions for three years always stored in the rocks, with a sufficient quantity of ammunition.

Gibraltar was first fortified in the modern style in the reign of the emperor Charles V. It was taken by the English in 1704. It has since been repeatedly besieged, but always without success. In July, 1799, commenced the celebrated siege by the combined forces of France and Spain; every scheme which ingenuity could devise, which rashness could

hazard, or force execute, was tried by the besiegers to no purpose, when, in 1783, the siege was abandoned.

ANCIENT ROADS.

THE construction of good public roads was considered an object of such primary importance by the ancient Romans, that all the chief cities of their vast empire were connected by roads, far superior to any that have been executed in later times, and of a much more expensive kind than the best railroads in this country. The Roman roads were made so firm and solid, that they have not entirely yielded to the dilapidations of fifteen centuries. They rendered an intercourse with the most distant provinces easy at all times, and rapid when occasion required. These roads ran nearly in direct lines from city to city, and have been the subject of universal astonishment and admiration.

Natural obstructions were removed or overcome by the efforts of labor or art; whether they consisted of marshes, lakes, rivers, or mountains. In flat districts the middle part of the road was raised into a terrace which commanded the adjacent country. It was formed of different layers of stones and gravel, bedded in excellent cement, the upper surface being paved with stone. Near the capital the

pavement was of granite; in other parts hard lava was used, worked in irregular polygons, and so accurately joined, that Palladio thinks they must have used sheets of lead as moulds to take the various angles and contours for fitting them together. In mountainous districts the roads were alternately cut through mountains and raised above the valleys, so as to preserve a level line or a uniform inclination, as was most adapted for the route. They founded on piles where the ground was not solid, and raised the road by strong side walls, or by arches and piers where it was necessary to gain elevation.

The Roman roads were much narrower than ours, the width of the carriage-way, as prescribed by the laws of the twelve tables, being only eight Roman feet,* but their carriages were also narrower than ours, the width of the wheel track not being more than three feet. The paved parts of their great military roads were wider, being 16 Roman feet, with two sideways, each 8 feet wide, separated from the middle way by two raised paths of 2 feet each; so that the entire width of the principal military roads did not exceed from 36 to 40 feet. The whole depth of materials was about three feet, and built in a most solid manner.

There were 29 military roads leading from

* The English foot is to the Roman as 1000 : 967.

Rome, some of which extended to the extreme parts of the empire—their total extent being, according to Rondelet, 52,964 Roman miles, or about 48,500 English miles.

The construction of the Roman roads was an object of state policy; with us it is the commercial interests of the country which feel the important advantages of a secure, certain, and speedy system of intercourse for the disposal and exchange of commodities. And since it is desirable among the people of the same state, that all should enjoy as nearly the same advantages for trade as the nature of things will allow, the power of internal communication ought to be encouraged, and its benefits extended to every part of the country of which the agricultural, mineral, or manufactured products, are of sufficient importance to render the communication beneficial to the state.

RAILROADS.

Among the wonderful improvements of the present age is the construction of railroads. The principal object of these roads is to form hard, smooth, and durable surfaces for the wheels of the carriage to run upon. These surfaces consist of parallel rails of iron, raised a little above the general level of the ground, with a gravelled road between the rails, where

horse-power is to be used; consequently a railroad combines the advantages of a good foothold for horses, and of smooth and hard surfaces for the wheels to roll upon. The wheels of railroad carriages are furnished with proper guides to keep them on the rails, and the circumferences of the wheels are made hard and smooth.

By thus using iron, we obtain a smooth, hard, and even surface, at an expense comparatively small; and the moving power has very little more than the friction of the axis to contend against. A carriage moving under such circumstances bears the nearest analogy to a body impelled on a smooth surface of ice, where it is well known that the velocity which may be given by a small power is immense; what the rails want in smoothness being compensated by the use of wheels. The effect of the air's resistance, and of the increase of friction, is the same in both cases.

In discussing the merits of railroads, we have to compare them with turnpike roads and canals. Railroads give the certainty of the turnpike road with a saving of seven-eighths of the power; one horse on a railroad producing as much effect as eight horses on a turnpike road. In the effect produced by a given power, the railroad is about a mean between the turnpike and a canal, where the rate is about three miles per hour; but where greater speed of conveyance is desirable, the

railroad equals the canal in effect, and even surpasses it. As much as had been the gain of railroads, when horse-power was used, the gain is immeasurably greater in the use of steam for a moving power.

In this country, the lumbering wagon, bearing its heavy loads, was formerly seen jolting its victims as it toiled up hills and over tiresome roads. Agricultural products, especially those in the interior of the west, were accumulated in the granaries, and decayed because they could not be transported to a market, and merchandise which might have found ample profits, were means of transportation provided, was heaped up in the warehouses, without purchasers, or was sold at a low price at every chance sale which presented itself. The population at remote points were kept in ignorance of passing events both at home and abroad, until a long time after they had happened; of events too, which, had they been known, might have exercised an important bearing upon their interests and happiness. The whole country was manacled as with chains, to struggle on against the obstacles which nature ever throws in the path of human industry, as trials of the soul.

Let us contrast that state of things with the present improved condition of the means of intercommunication. Upon the land and the water, upon the surfaces of all our wide rivers and lakes, and upon our hills and valleys, we

now see the smoke of the steamship, and hear the clattering of the railroad car, rushing through the waves against wind and tide, propelling huge fabrics with amazing speed, or drawing their splendid saloons almost with the rapidity of lightning along their iron tracks. It seems indeed as if our own age is destined to realize the gorgeous scenes of oriental fiction, their floating palaces wafted along by melodious music, with banners streaming from their mirrored walls, their flying dragons rushing through the air, who counted time and space as nothing. These are the triumphs of our own age, the laurels of mechanical philosophy, of untrammelled mind, and a liberal commerce!

Railroads were first introduced into this country less than twenty years since, and have been making gradual progress from that time. The system of railroads is primarily designed to unite the distant portions of the country, and to transport their respective products to the most profitable markets. Accordingly, it has been found proper to extend the large lines from the principal marts of trade and commerce to important points, which may form a nucleus to the surrounding country, each line possessing diverging tracks to the commercial depots which border them. If we survey the map of the United States, we shall find that the termini of these lines, at both ends, rest at the principal commercial towns of the country,

both in the east and west. The principal termini of each track upon the Atlantic seaboard may be found in Boston, New York, Philadelphia, Norfolk, Wilmington, Charleston, and Savannah. From these grand points of shipment, the railroad tracks run across the interior, and intersecting in their course the most prominent villages or cities, terminate at the grand marts of western commerce, and the shores of their navigable waters.

The advantages of these works are obvious, and must be permanently felt in our own widely extended territory. These advantages are derived from the fact that, notwithstanding the vast expense of their construction, which will require a long time to return the outlays into the coffers of the stockholders, they nevertheless afford safe, elegant, and rapid conveyances for travellers, and convenient means for the transportation of articles of bulk from place to place. The application of steam to this mode of conveyance evokes from the elements of nature a power which is fleeter than the swiftest antelope, and more mighty than that of the strongest elephant.

We believe that the steam-engine, upon land, is to be one of the most valuable agents of the present age, because it is swifter than the greyhound, and powerful as a thousand horses; because it has no passions and no motives; because it is guided by its directors; because it runs and never tires; because it

may be applied to so many uses, and expanded to any strength. We believe that it is to be the great moral agent in bringing the world into neighborhood; and the human mind, in various parts of the globe, into contact, and, ultimately, into concurrent action. By approximating different nations, we believe that it is to increase intelligence; and, by consequence, advance the benevolent enterprises of the day. By augmenting the destructive power of men, we believe that it is designed to dull the edge of war, and plant perennial bowers of the olive-branch upon fields which have been fattened by the blood of millions.

The sensation, now scarcely worn off, in which we were first borne away by the railroad car, is not easy to describe. We feel as if a new power had been called into existence, and that we were ushered into a new era of human progress. The beauty of the long trains of coaches, in size and decoration like the parlor, rushing over plain and through valley, the trim round barrel of the engine, which seems too small to drag so ponderous a bulk, the long iron arms which project from its furnace, in shape like the legs of a grasshopper, the bright polished wheels, the short black hissing pipe, the bounding speed of the car, when its propelling force is increased, strike us with amazement. Nor is the distant view of the railroad car less to be admired. At a distance, we behold it upon the landscape,

dragging its linked trains with a motion entirely distinct from any thing else, a motion neither rolling nor creeping, but gliding along its iron track like some new land monster different from any other species, as strange as the sea-serpent of Nahant, or a Kraken upon the coast of Norway!

The advantages of railroads to the nation in an economical point of view, will be no less remarkable. Our extended territory, watered as it is so profusely by navigable streams and lakes, possesses distinct local advantages which may render important aid to the prosperity of the other parts. Our Atlantic seaboard, crowded with a dense population, and studded as it is with our most important cities, although containing a comparatively barren soil, has, it is well known, long derived its prosperity from commerce, and in that portion comprised by New England, the foundation of a system of manufactures has been commenced, and carried out against formidable obstacles with considerable success.

If we turn to the south, we find its low and level soil producing harvests of cotton, rice, tobacco, and sugar, peculiar to itself, and which have heretofore been a source of great profit to its cultivators. Passing to the west, we find whole mountains of coal, and iron, and lead, and copper, as well as all other minerals required for use in developing the resources of a nation, besides a boundless agricultural

territory, which will yield in unexampled abundance all the productions which are needed for the support of animal life, as well as the most important staples for exportation. It is the design and necessary consequence of our American railroads to construct safe, rapid, and cheap paths to these several sections of the country for the travelling community, and to provide vehicles for the transportation of their agricultural, mineral, and commercial products to the best markets, whether these markets are found at home or abroad.

The lines of the railroads of the United States are destined to run along the Atlantic seaboard, and will connect all its principal cities, Portsmouth, Boston, New York, Philadelphia, Baltimore, Norfolk, Fredericksburgh, and Charleston, by their luxurious vehicles of transportation, thus furnishing a channel for trade and travel upon the land throughout the whole distance from north to south. At Charleston, Savannah, Pensacola, and New Orleans, we find other lines running into the interior of the west, even to the borders of the Missouri, which will furnish safe outlets for their products. In the interior of the western territory, at Indianapolis and Cincinnati, at Milwaukie, Chicago, and Detroit, we find other lines extending to the borders of the lakes, interlocking with numerous canals and navigable streams, and from the banks of these lakes and streams, direct lines running east-

ward to the principal cities, connecting the western marts of trade with the prominent eastern markets; thus furnishing to the whole country commercial arteries, which are as important to the mercantile prosperity of the nation as the arterial system to the health of the human body.

It is not a vain imagining to look forward for the distance of half a century into the commercial position of our nation, aided by our national enterprise, and by the influence of canals, railroads, and other public works. And what a picture is here spread before us, if the future is to be judged by the past, and consequences by the magnitude of their causes! The new agents, which have been but recently called to the assistance of man, must vastly accelerate his progress; and with modern nations, years are but as days. What improvements have been in fact made within the last twenty years, in all the branches of the mechanic arts and manufactures, in locomotion, which have aided in subjecting nature to the dominion of man! We have full conviction that at that period the rivers and lakes of our country will be crowded with steamships, and manufacturing establishments will smile upon our waterfalls, well regulated by law, and turning out fabrics which will bear a safe competition with those of foreign importation. We believe that our railroads and their kindred works will so course the country, that to

travel to its remotest points will be as easy as to move the little painted blocks on the surface of a checker-board.

The manufacturing districts of the east will pour their products, whether they be the fruits of machinery or of navigation, into the west by their long lines of railroads, and the golden harvests of rice, and sugar, and cotton, and tobacco, which now adorn the sunny plains of the south, will be carried along the same tracks, to feed the manufacturing system of the east, or the growing population of the west. We believe that the west, in return, will pour down upon the south and upon the east the agricultural products which will then be spread over the wide surfaces of the prairies of Illinois, the oaklands of Michigan, the rich land of Ohio, and the forests of Indiana, as well as the mountains of lead and copper, coal and iron, which now lie imbedded in the soil of Missouri, Wisconsin, and Iowa, and the hills of western Pennsylvania. We believe that these several products, transported to their places of shipment, will be exported abroad in steamships at the east and west—at New Orleans as well as New York, upon the Ohio as well as upon the Hudson—and that the republic will become a producing and exporting nation, made thus by the agency of steam.

In order to judge of the achievements of this mighty agent, it may be stated that the rail-

road car could be pressed to the speed of sixty miles in an hour; and at that rate it would require but seventeen days for its engines to travel around the globe, did a continuous surface of land encircle it. And without any undue pressure of speed, persons may go from Boston to New York in eight hours; to Washington in twenty-four hours; and to St. Louis and back again in less than a week.

The construction of railroads has already done much, in this country, in new modelling our social and business relations. Distant points, to all practical purposes, have been brought into juxtaposition. Distance has been comparatively annihilated. Those who were unknown to each other have become neighbors. This has been done in a few years. More—much more is to be anticipated. Had any one predicted twenty years since, that in the United States we should now have 4500 miles of good railroads, he would have been thought insane. Yet such is the fact; and this has been effected by an expenditure of $112,000,000.

THE SHOEMADOO AT PEGU.

The object in Pegu that most attracts and most merits notice, says Mr. Symes in his Embassy to Ava, is the noble edifice of Shoemadoo, or the Golden Supreme. This extraordi-

nary pile of buildings is erected on a double terrace, one raised upon another. The lower and greater terrace is about ten feet above the natural level of the ground, forming an exact parallelogram: the upper and lesser terrace is similar in shape, and rises about twenty feet above the lower terrace, or thirty above the level of the country. I judged a side of the lower terrace to be 1391 feet; of the upper, 684.

The walls that sustained the sides of the terrace, both upper and lower, are in a ruinous state; they were formerly covered with plaster, wrought into various figures; the area of the lower is strewed with the fragments of small decayed buildings, but the upper is kept free from filth, and is in tolerably good order. There is reason to conclude that this building and the fortress are coeval, as the earth of which the terraces are composed appears to have been taken from the ditch; there being no other excavation in the city, or in its neighborhood, that could have afforded a tenth part of the quantity.

The terraces are ascended by flights of stone steps, which are now broken and neglected. On each side are dwellings of the Rhahaans, raised on timbers four or five feet from the ground; these houses consist only of a large hall: the wooden pillars that support them are turned with neatness; the roofs are covered with tiles, and the sides are made of

boards; and there are a number of bare benches in every house, on which the Rhahaans sleep; but we saw no other furniture.

Shoemadoo is a pyramidical building composed of brick and mortar, without excavation or aperture of any sort; octagonal at the base, and spiral at the top; each side of the base measures 162 feet; this immense breadth diminishes abruptly, and a similar building has not unaptly been compared in shape to a large speaking-trumpet.

Six feet from the ground there is a wide projection that surrounds the base, on the plane of which are fifty-seven small spires of equal size, and equidistant; one of them measured twenty-seven feet in height, and forty in circumference at the bottom. On a higher ledge there is another row consisting of fifty-three spires of similar shape and measurement.

A great variety of mouldings encircle the building; and ornaments somewhat resembling the fleur-de-lis surround the lower part of the spire; circular mouldings likewise girt it to a considerable height, above which there are ornaments in stucco not unlike the leaves of a Corinthian capital; and the whole is crowned by a Tee, or umbrella, of open iron-work, from which rises a rod with a gilded pennant.

The tee or umbrella is to be seen on every sacred building that is of a spiral form; the raising and consecration of this last and indis-

pensable appendage, is an act of high religious solemnity, and a season of festivity and relaxation. The present king bestowed the tee that covers Shoemadoo. It was made at the capital; and many of the principal nobility came down from Ummerapoora to be present at the ceremony of its elevation.

The circumference of the tee is fifty-six feet; it rests on an iron axis fixed in the building, and is farther secured by large chains strongly riveted to the spire. Round the lower rim of the tee are appended a number of bells, which agitated by the wind make a continual jingling.

The tee is gilt, and it is said to be the intention of the king to gild the whole of the spire. All the lesser pagodas are ornamented with proportionable umbrellas of similar workmanship, which are likewise encircled by small bells. The extreme height of the edifice, from the level of the country, is 361 feet, and above the interior terrace, 331 feet.

On the southeast angle of the upper terrace there are two handsome saloons, or kioums, lately erected, the roofs composed of different stages, supported by pillars; we judged the length of each to be about sixty feet, and the breadth thirty: the ceiling of one is already embellished with gold leaf, and the pillars are lackered; the decoration of the other is not yet completed. They are made entirely of wood; the carving on the outside is laborious and

minute: we saw several unfinished figures of animals and men in grotesque attitudes, which were designed as ornaments for different parts of the building. Some images of Guadama, the supreme object of Birman adoration, lay scattered around.

At each angle of the interior and higher terrace there is a temple 67 feet high, resembling in miniature the great temple: in front of that, in the southwest corner, are four gigantic representations in masonry of Palloo, or the evil genius, half beast, half human, seated on their hams, each with a large club on the right shoulder. The Pundit who accompanied me, said that they resembled the Rakuss of the Hindoos. These are guardians of the temple.

Nearly in the centre of the east face of the area are two human figures in stucco, beneath a gilded umbrella; one, standing, represents a man with a book before him and a pen in his hand; he is called Thasiamee, the recorder of mortal merits and mortal misdeeds; the other, a female figure kneeling, is Mahasumdera, the protectress of the universe, so long as the universe is doomed to last; but when the time of general dissolution arrives, by her hand the world is to be overwhelmed and everlastingly destroyed.

A small brick building near the northeast angle contains an upright marble slab, four feet high and three feet wide: there is a long legible inscription on it. I was told it was an

account of the donations of pilgrims of only a recent date.

Along the whole extent of the north face of the upper terrace, there is a wooden shed for the convenience of devotees who come from a distant part of the country. On the north side of the temple are three large bells of good workmanship, suspended nigh the ground, between pillars; several deers' horns lie strewed around; those who come to pay their devotions first take up one of the horns and strike the bell three times, giving an alternate stroke to the ground: this act, I was told, is to announce to the spirit of Guadama the approach of a suppliant.

There are several low benches near the foot of the temple, on which the person who comes to pray places his offering, commonly consisting of boiled rice, a plate of sweetmeats, or cocoa-nut fried in oil; when it is given, the devotee cares not what becomes of it; the crows and wild dogs often devour it in presence of the donor, who never attempts to disturb the animals. I saw several plates of victuals disposed of in this manner, and understood it to be the case with all that was brought.

There are many small temples on the areas of both terraces, which are neglected and suffered to fall into decay. Numberless images of Guadama lie indiscriminately scattered. A pious Birman who purchases an idol, first pro-

cures the ceremony of consecration to be performed by the Rhahaans; he then takes his purchase to whatever sacred building is most convenient, and there places it in the shelter of a kioum, or on the open ground before the temple; nor does he ever again seem to have any anxiety about its preservation, but leaves the divinity to shift for itself. Some of these idols are made of marble that is found in the neighborhood of the capital of the Birman dominions, and admits of a very fine polish; many are formed of wood, and gilded, and a few are of silver; the latter, however, are not usually exposed and neglected like the others. Silver and gold are rarely used, except in the composition of household gods.

On both the terraces are a number of white cylindrical flags, raised on bamboo poles; these flags are peculiar to the Rhahaans, and are considered as emblematical of purity, and of their sacred function. On the top of the staff there is a henza, or goose, the symbol both of the Birman and Pegu nations.

AMERICAN ANTIQUITIES.

The numerous remains of ancient fortifications and mounds found in the western states, are the admiration of the curious and a matter of much speculation. They are mostly of an

oblong form, situated on well-chosen ground and near the water.

One of the fortifications, or towns, at Marietta, Ohio, contains forty acres, accompanied by a wall of earth from six to ten feet high. On each side are three openings, at equal distances, resembling gateways. The works are undoubtedly very ancient, as there does not appear to be any difference in the age or size of the timber growing on or within the walls, and that which grows without; and the Indians have lost all tradition respecting them. Dr. Cutler, who accurately examined the trees on the works at Marietta, thinks from appearances that they are on the second growth, and that the works must have been built upwards of one thousand years.

At a convenient distance from these works always stands a mound of earth thrown up in the form of a pyramid. Upon examination, some of these mounds are found to contain an immense number of human skeletons.

The ancient works on the western branches of the Muskingum river extend nearly two miles, the ramparts of which are now in some places more than eighteen feet in perpendicular height.

In Pompey, Onondaga county, New York, are vestiges of a town, the area of which included more than five hundred acres. It was protected by three circular or elliptical forts, eight miles distant from each other. They

formed a triangle which enclosed the town. From certain indications, this town seems to have been stormed and taken on the line of the north side.

In Camillus, in the same county, are the remains of two forts, one covering about three acres on a very high hill. It had one eastern gate, and a communication at the west towards a spring about ten rods from the fort. Its shape was elliptical. The ditch was deep, and the eastern wall ten feet high. The other fort is almost half a mile distant on lower ground, constructed like the other and about half as large. Shells of testaceous animals, numerous fragments of pottery, pieces of brick, and other signs of an ancient settlement were found by the first European settlers.

On the east bank of Seneca river, six miles south of Cross and Salt lakes, the remains of an ancient Indian defence have been discovered, together with a delineation of ill-shapen figures, supposed to have been hieroglyphical, and engraven as with a chisel, on a flat stone, five feet in length, three and a half in breadth, and six inches thick; evidently a sepulchral monument. The principal fortification was two hundred and twenty yards in length, and fifty-five in breadth. The bank and corresponding ditch were remarkably entire; as were two apertures, opposite each other in the middle of the parallelogram, one opening to the water and the other facing the forest.

About half a mile south of the great work was a large half-moon, supposed to have been an outwork, but attended with this singularity, that the extremities of the crescent were from the larger fort. The banks of the ditch, both of this and the first fortress, were covered with trees that exhibited extremity of age.

The flat stone above mentioned was found over a small elevation in the great fort. Upon removing it, one of the visiting party dug up with his cane a piece of an earthen vessel, which, from the convexity of the fragment, was supposed to contain two gallons. It was well burned, of a red color, and had its upper end indented, as with the finger in its impressionable state.

Eastward, these fortifications have been traced eighteen miles from Manlius Square; and in Oxford, Chenango county, on the east bank of the Chenango river, are the remains of another fort, remarkable for its great antiquity. Northward, as far as Sandy creek, about fourteen miles from Sackett's Harbor, is one which covers near fifty acres and contains numerous fragments of pottery.

Westward, they are discovered in great numbers. There is a large one in the town of Onondaga, one in Scipio, two near Auburn, three near Canandaigua, and several between the Seneca and Cayuga lakes. A number of ancient fortifications and burial-places have also been discovered in Ridgeway, Genesee county.

Near the Tonawanda creek, at the double fortified town, are some interesting antiquities described by Dr. Kirkland. They are the remains of two forts. The first contained about four acres, and the other, distant about two miles, and situated on the other extremity of the ancient town, enclosed twice that quantity of ground.

The ditch around the former was about five or six feet deep. A small stream of water and a high bank circumscribed nearly one-third of the enclosed ground. There were traces of six gates or avenues round the ditch, and near the centre a way was dug to the water. A considerable number of large thrifty oaks had grown up within the enclosed ground, both in and upon the ditch ; some of them appeared to be at least two hundred years old or more.

Near the northern fortification, which was situated on high ground, were found the remains of a funeral pile, probably the burying-place of the slain, who had fallen in some sanguinary conflict. The earth was raised about six feet above the common surface, and betwixt twenty and thirty feet in diameter. The bones appeared on the whole surface of the raised earth, and stuck out in many places on the sides.

On the south side of Lake Erie is a series of old fortifications, from Cattaraugus creek to the Pennsylvania line, a distance of fifty miles.

Some are from two to four miles apart, others half a mile only. Some contain five acres. The walls, or breastworks, are of earth, and generally on ground where there are appearances of creeks having once flowed into the lake, or where there was a bay.

These vestiges of ancient fortified towns, are widely scattered throughout the extensive territory of the Six Nations, and, by Indian report, in various other parts. There is one on a branch of the Delaware river, which, from the size and age of some of the trees, that have grown on the banks and in the ditches, appears to have existed nearly one thousand years, and perhaps for a still longer period. These antiquities afford demonstrative evidence of the remote existence of a vast population, settled in towns, defended by forts, cultivating agriculture, and more advanced in civilization than the nations which have inhabited the same countries since the European discovery.

The most probable conjecture respecting these people is, that they were of Tartar origin, and came across to this continent near Behring's Straits, and going southward followed the course of the great rivers; finding the soil fruitful on the Ohio and Mississippi, they resided there for a while, till at length, following each other, they established themselves in the warm and fertile vales of Mexico.

INVENTION OF STEAMBOATS.

The first successful application of steam for the purpose of propelling boats, was accomplished by Robert Fulton, a native of the state of Pennsylvania. Mr. Fulton's inventive genius displayed itself at an early age. It seems that as early as the year 1793 he had conceived the idea of propelling vessels by steam, and he speaks in some of his writings with great confidence of its practicability. After a number of years' residence in Europe, and making a variety of experiments both in that country and in this, his labors were finally crowned with success.

In the spring of 1807, the first steamboat built in this country was launched from a ship-yard in New York, on the East River. The engine, which he procured from England, was put on board in August, and the boat was completed and moved by her machinery to the Jersey shore. This boat, which was called the Clermont, soon after sailed for Albany, which voyage she accomplished, going at the rate of about five miles an hour; she afterwards became a regular passage boat between New York and Albany.

The account of her first voyage to Albany is thus described: "She excited the astonishment of the inhabitants on the shores of the Hudson, many of whom had not heard of an engine, much less a steamboat. She was de-

scribed by some who had indistinctly seen her passing in the night, as a monster moving on the waters, defying the tide, and breathing flames and smoke. Her volumes of smoke and fire by night, attracted the attention of the crews of other vessels.

"Notwithstanding the wind and tide were adverse to its progress, they saw with astonishment that it was rapidly approaching them; and when it came so near that the noise of the machinery and paddles was heard, the crews, in some instances, sunk beneath their decks from the terrific sight and left their vessels to go on shore; while others prostrated themselves, and besought Providence to protect them from the approaches of this horrible monster, which was marching on the tides, and lighting its path by the fires which it vomited." From the time that this boat was put in motion, this noble invention has been rapidly extended, till it is now used in every part of the civilized world.

The following is from a discourse delivered by Judge Story before the Boston Mechanics' Lyceum: "I myself have heard the illustrious inventor relate, in an animated and affectionate manner, the history of his labors and discouragements. 'When,' said he, 'I was building my first steamboat at New York, the project was viewed by the public, either with indifference, or with contempt, as a visionary scheme. My friends, indeed, were civil, but

they were shy. They listened with patience to my explanations, but with a settled cast of incredulity on their countenances. I felt the force of the lamentation of the poet—

> 'Truths would you teach to save a sinking land,
> All shun, none aid you, and few understand.'

"'As I had occasion to pass daily to and from the building yard, while my boat was in progress, I have loitered often unknown near the idle groups of strangers, gathering in little circles, and heard various inquiries as to the object of this new vehicle. The language was uniformly that of scorn, or sneer, or ridicule. The loud laugh often rose at my expense; the dry jest, the wise calculation of losses and expenditures, the dull but endless repetition of the Fulton Folly. Never did a single encouraging remark, a bright hope, or a warm wish, cross my path. Silence itself was but politeness, veiling its doubts or hiding its reproaches.

"'At length the day arrived when the experiment was to be put into operation. To me it was a most interesting and trying occasion. I invited my friends to go on board and witness the first successful trip. Many of them did me the favor to attend as a matter of personal respect; but it was manifest that they did it with reluctance, fearing to be the partners of my mortification and not of my triumph. I was well aware that in my case

there were many reasons to doubt of my own success. The machinery was new and ill-made; many parts of it were constructed by mechanics unaccustomed to such work; and unexpected difficulties might reasonably be supposed to present themselves from other causes.

" 'The moment arrived in which the word was to be given for the vessel to move; my friends were in groups upon deck; they were silent, and sad, and weary. I read in their looks nothing but disaster, and almost repented my efforts. The signal was given and the boat moved a short distance, and then stopped and became immoveable. To the silence of the preceding moment now succeeded murmurs of discontent, and agitations, and wishes, and shrugs. I could hear distinctly repeated, "I told you it would be so—it is a foolish scheme—I wish we were well out of it." I elevated myself upon a platform, and addressing the assembly, stated that I knew not what was the matter, but if they would be quiet and indulge me for half an hour, I would either go on or abandon the voyage for that time.

" 'This short respite was conceded to without objection. I went below, examined the machinery, and discovered that the cause was a slight mal-adjustment of some of the works. The boat was put in motion. She continued to move on. All were still incredulous. None seemed willing to trust the evidences of their

own senses. We left the fair city of New York; we passed through the romantic and ever-varying scenery of the Highlands; we descried the clustering houses of Albany; we reached its shores; and then, even then, when all seemed achieved, I was the victim of disappointment. Imagination superseded the influence of fact. It was then doubted if it could be done again; or if done, it was doubted if it could be made of any great value.'

"Such was the history of the first experiment, as it fell, not in the very language which I have used, but in substance, from the lips of the inventor. He did not live, indeed, to enjoy the full glory of his invention. It is mournful to say that attempts were made to rob him in the first place of the merits of his invention, and next of its fruits. He fell a victim to his efforts to sustain his title to both. When already his invention had covered the waters of the Hudson, he seemed little satisfied with the results, and looked forward to far more extensive operations.

"'My ultimate triumph,' he used to say, 'my ultimate triumph will be on the Mississippi. I know, indeed, that even now it is deemed impossible, by many, that the difficulties of its navigation can be overcome. But I am confident of success; I may not live to see it, but the Mississippi will yet be covered with steamboats, and thus an entire change be

wrought in the course of the internal commerce and navigation of our country.'

"And it has been wrought—and the steamboat, looking to its effects upon commerce and navigation; to the combined influences of facilities of travelling and the facility of trade; of rapid circulation of news, and still more rapid circulation of pleasure and products; seems destined to be numbered among the noblest benefactions of the human race."

A FIRST-RATE MAN OF WAR.

A MAN in health consumes, in the space of 24 hours, about eight pounds of victuals and drink, consequently 8,000 pounds of provisions are required daily in such a ship. Now let us suppose her to be fitted out for three months only, and we shall find that she must be laden with 720,000 pounds of provisions. A large forty-two pounder weighs about 6,100 pounds if made of brass, and about 5,500 pounds if of iron; and generally there are 28 or 30 of these on board a ship of 100 guns, the weight of which, exclusive of that of their carriages, amounts to 183,000 pounds.

On the second deck are 30 twenty-four pounders, each weighing about 5,100 pounds, and therefore altogether, 153,000 pounds; and the weight of the 26 or 28 twelve-pounders on the lower deck, amounts to about 76,400 pounds,

and that of the 14 six-pounders on the upper deck to about 26,600 pounds; and besides that, on the round-tops, there are even three-pounders and swivels. Now, if to this we add, that the complete charge of a forty-two pounder weighs about 64 pounds, and that at least upwards of 100 charges are required for each gun, we shall find this to amount nearly to the same weight as the guns themselves.

In addition to this, we must reflect, that every ship must have, by way of providing against exigencies, at least another set of sails, cables, cordage, and tacklings, which altogether amount to a considerable weight. The stores, likewise, consisting of planks, pitch, and tow; the chests belonging to the officers and sailors; the surgeon's stores, and various other articles requisite on a long voyage; as also the small-arms, bayonets, swords, and pistols, are no inconsiderable load; to which we must finally add, the weight of the crew, which is not very trifling; so that one of these large ships carries at least 2,162 tons burden, or 4,324,000 pounds, and at the same time is steered and governed with as much ease as the smallest boat.

A first-rate man-of-war has its gun-deck from 159 to 174 feet in length, and from 44 to 50 feet broad; contains from 1,313 to 1,882 tons; has from 706 to 800 men; and carries from 96 to 110 guns. This ship requires about 60,000 cubic feet of timber, and uses 180,000

pounds of rough hemp in the cordage and sails for it. The ground on which the timber for a 74 gun-ship would require to grow, would be 14 acres. It requires 3,000 loads of timber, each load containing 51 cubic feet; 1,500 well-grown trees of two loads each, will cover 14 acres at 20 feet asunder; 3,000 loads of rough oak, at 2*s.* per foot, or £5 per load, will cost £15,000.

CURIOUS CLOCK AT STRASBURGH.

At Strasburgh there is a clock of all others the most famous, invented by Conradius Dasipodius, in the year 1571. Before the clock stands a globe on the ground, showing the motions of the heavens, stars, and planets. The heavens are carried about by the first mover in twenty-four hours. Saturn, by his proper motion, is carried about in thirty years; Jupiter in twelve; Mars in two; the Sun, Mercury, and Venus, in one year; and the Moon in one month. In the clock itself there are two tables on the right and left hand, showing the eclipses of the sun and moon from the year 1573 to the year 1624.

The third table in the middle, is divided into three parts. In the first part the statues of Apollo and Diana show the course of the year and the day thereof, being carried about in one year; the second part shows the year of

our Lord and the equinoctial days, the hours of each day, the minutes of each hour, Easter day and all other feasts, and the dominical letter. The third part hath the geographical description of all Germany, and particularly of Strasburgh, and the names of the inventor and all the workmen.

In the middle frame of the clock is an astrolabe, showing the sign in which each planet is every day; and there are the statues of the seven planets upon a round piece of iron, lying flat; so that every day the planet that rules the day comes forth, the rest being hid within the frames, till they come out by course at their day; as the sun upon Sunday, and so for all the week. And there is also a terrestrial globe, which shows the quarter, the half-hour, and the minutes. There is also the skull of a dead man; and statues of two boys, whereof one turns the hour-glass when the clock hath struck, the other puts forth the rod in his hand at each stroke of the clock. Moreover, there are the statues of Spring, Summer, Autumn, and Winter, and many observations of the moon.

In the upper part of the clock are four old men's statues, which strike the quarters of the hour; the statue of Death comes out at each quarter to strike, but is driven back by the statue of Christ, with a spear in his hand, for three quarters, but in the fourth quarter, that of Christ goes back, and that of Death strikes

the hour with a bone in his hand, and then the chimes sound. On the top of the clock is an image of a cock, which twice in the day crows aloud and claps his wings. Besides, this clock is decked with many rare pictures; and, being on the inside of the church, carries another frame to the outside of the walls, wherein the hours of the sun, the courses of the moon, the length of the day, and such other things are set out with great art.

CLOCKS IN THE FORM OF CHARIOTS.

Surprising as the mechanical wonders just described may seem to be, they appear to be excelled by two clocks made a few years since, by an English artist, and sent as a present from the East India Company to the Emperor of China.

These clocks are in the form of chariots, in which are placed, in a fine attitude, a lady leaning her right hand upon a part of the chariot; under which is a clock of curious workmanship, little larger than a shilling, that strikes, and repeats, and goes eight days. Upon her finger sits a bird finely modelled, and set with diamonds and rubies, with its wings expanded in a flying posture, and actually flutters for a considerable time on touching a diamond button below it; the body of the bird (which contains part of the wheels

that in a manner give life to it) is not the bigness of the sixteenth part of an inch.

The lady holds in her left hand a gold tube, not much thicker than a large pin, on the top of which is a small round box, to which a circular ornament set with diamonds not larger than a sixpence is fixed, which goes round near three hours, in a constant regular motion. Over the lady's head, supported by a small fluted pillar no bigger than a quill, are two umbrellas; under the largest of which a bell is fixed, at a considerable distance from the clock, and seeming to have no connection with it; but from which a communication is secretly conveyed to a hammer that regularly strikes the hour, and repeats the same at pleasure by touching a diamond button fixed to the clock below.

At the feet of the lady is a gold dog, before which, from the point of the chariot, are two birds fixed on spiral springs, the wings and feathers of which are set with stones of various colors, and appear as if flying away with the chariot, which, from another secret motion, is contrived to run in a straight, circular, or any other direction. A boy that lays hold of the chariot behind, seems also to push it forward. Above the umbrella are flowers and ornaments of precious stones, and it terminates with a flying dragon set in the same manner. The whole is of gold, most curiously executed, and embellished with rubies and pearls.

MECHANICAL THEATRE.

This curious piece of mechanism exhibited at Paris is thus described by the Rev. Mr. Evans:—The spectacle in the *Picturesque and Mechanical Theatre* consisted of scenery and appropriate little moving figures. The first scene was a view of a wood in early morning; every object looked blue, fresh, and dewy. The gradations of light, until the approach of meridian day, were admirably represented. Serpents were seen crawling in the grass. A little sportsman entered with his fowling-piece, and imitated all the movements natural to his pursuits; a tiny wild-duck rose from a lake and flew before him. He pointed his gun and changed his situation—pointed again and fired; the bird dropped, he threw it over his shoulders, fastened his gun, and retired.

Wagons, drawn by horses four inches high, passed along; groups of peasantry followed, exquisitely imitating all the indications of life. Amongst several other scenes was a beautiful view of the Bay of Naples, and the great bridge, over which little horses with their riders passed in the various paces of walking, trotting, and galloping. All the minutiæ of nature were attended to. The ear was beguiled with the patting of the horses' hoofs upon the pavement; and some of the little animals reared, and ran before the others. There were, also, some charming little sea-pieces, in

which the vessels sailed with their heads towards the spectators, and manœuvred in a surprising manner.

The whole concluded with a storm, and shipwrecked sailors were seen floating in the water, then buried in the surge. One of them rose again and reached a rock. Boats put off to his relief and perished in the attempt. The little figure was seen displaying the greatest agonies. The storm subsided: tiny persons appeared upon the top of a projecting cliff, near a watch-tower, and lowered a rope to the little sufferer below, which he caught, and after ascending to some height by it, overwhelmed by fatigue, lost his hold. After recovering from the fall, he renewed his efforts, and at length reached the top in safety, amidst the acclamations of the spectators.

BUNKER HILL MONUMENT.

To future generations, the Bunker Hill Monument will be among the most interesting works of the kind in this country. Indeed, it is so now. Nor is it interesting simply because of its architectural perfection; but it will remind the yeomanry on the hills in the surrounding country of the events which it commemorates. It will point to the history of the American Revolution with the steadiness and certainty of the magnetic needle.

Hence thousands yet unborn will be induced to read the story of those perilous days. It is proper, therefore, in connection with an abstract of the statistics of the monument, to give an abstract of the events it is designed to preserve in all the freshness of truth.

Bunker Hill, in Charlestown, Mass., has obtained great celebrity, as being the theatre of the first regular battle between the Provincial and the British troops in the war of the Revolution. The place where the battle was fought was originally called Breed's Hill, Bunker Hill being of about an equal height, and north of it, at the entrance of the peninsula on which Charlestown is situated. On this height a detachment of 1000 men were directed to intrench themselves, on the night of the 16th of June, 1775.

By some mistake, they proceeded to Breed's Hill, which is nearer to Boston, and which has since been denominated Bunker Hill, as the name is intimately associated with the battle. The men had worked hard, with such secrecy, that, by the dawn of day, they had, unperceived by the enemy, thrown up a redoubt of eight rods square. The incessant fire from the shipping and a battery on Copp's Hill, in Boston, did not prevent the Americans from completing by mid-day, with great labor and fatigue, a slight breastwork from the redoubt to the bottom of the hill on the east side. Between 12 and 1 o'clock, the British, to the amount of

3000 men, with a portion of artillery, under Major-general Howe and Brigadier-general Pigot, landed in Charlestown, and having formed their men in two lines, advanced slowly to the attack, frequently halting to allow their artillery time to fire.

The Americans coolly waited in their intrenchments their approach. It is said that General Putnam, who was a leader, though Colonel Prescott had the chief command, told the men that they had not a charge of powder to lose, and exhorted them not to fire upon the enemy until they could *see the whites of their eyes.* They were suffered to approach within 10 or 12 rods, when these practised American marksmen discharged their pieces incessantly with such deadly aim, as threw the British into confusion and caused them to retreat precipitately to the bottom of the hill. By the efforts of their officers they were formed the second time and advanced to the attack. The Americans waited until they were within five or six rods, when they opened a destructive fire, which brought them to a stand and threw them into confusion.

At this critical moment General Clinton arrived from Boston, and succeeded in rallying his men and in bringing them to a charge, while some cannon were brought to a station that enabled them to rake the breastwork from end to end. The works were now attacked with fixed bayonets, and as the Americans

were not furnished with them, and as their ammunition began to fail, they found it necessary to retreat over Charlestown neck, in doing which they were exposed to the fire of the Glasgow man-of-war and the floating batteries, without suffering great injury from them.

The British were victorious, but it was a dear-bought victory. The British loss, by the acknowledgment of General Gage, was 1,054 killed and wounded, and the engagement was particularly fatal to the officers, as they were doubtless singled out by the American marksmen. Nineteen commissioned officers were killed, and seventy more wounded. Among the former was Major Pitcairn, who led the attack at Lexington. Of the men, 226 were killed and 828 wounded. The Americans, who had at no time more than 1,500 men engaged, had 145 killed and 304 wounded and missing, making in the whole 449. Among the former was Major-general Warren, then president of the colonial congress, and a volunteer. The British did not pursue the victory farther than to intrench themselves on Bunker's Hill, and the Americans did the same on Prospect Hill in front of them, about halfway to Cambridge.

Early in the battle, an order was sent to Copp's Hill, in Boston, to set Charlestown on fire, which was effected by discharging a carcass into the place, and the fire soon spread over it. But the direction of the wind pre-

vented the smoke from seriously annoying the Americans.

On the site of the battle, 62 feet above the level of the harbor, on ground purchased for the purpose, the Bunker Hill Monument, a splendid obelisk, has been erected. The corner-stone was first laid by the celebrated La Fayette, on the fiftieth anniversary of the battle, June 17th, 1825, in the presence of an immense concourse of citizens, when an address was delivered by the Hon. Daniel Webster. This foundation having been insufficient, the corner-stone of the present structure was laid in a more substantial manner, in March, 1827.

The monument was completed, July 23d, 1842. The obelisk is 30 feet square at the base, and 16 feet $4\frac{1}{2}$ inches at the top, having a diminution of 14 feet $7\frac{1}{2}$ inches above the base. It is substantially built of hewn Quincy granite. The height from the base to the commencement of the apex is 208 feet; and from the base to the top of the apex it is 221 feet in height. The whole cost has been $119,800. The interior is circular, having a diameter of 10 feet 7 inches at the bottom, and 6 feet 4 inches at top, and is ascended by 294 steps. The top is an elliptical chamber, 17 feet high, 11 feet in diameter, with four windows 2 feet 8 inches high, 2 feet 2 inches in breadth, and presents the most splendid view in the United States, combining in a remarkable degree the beautiful and the sublime.

Boston, its harbor and environs, with the more distant country, embracing mountain scenery, are spread out in a most enchanting prospect. The obelisk consists of 90 courses of hewn stone, 84 above the base, and 6 below it. There are a number of windows in the structure, closed with iron shutters, besides numerous apertures.

The ladies of Boston, by a fair and other donations, raised a large sum, which ensured the completion of the monument. At the fair, by tickets and the sale of articles, the sum of $32,000 was raised. The finishing of the monument, July 23d, 1842, was hailed by the firing of cannon and other testimonials of rejoicing. The anniversary of the battle and the completion of the monument were celebrated in a splendid manner, June 17th, 1843, in the presence of the President of the United States and the heads of departments, and an immense concourse of citizens, when an address was delivered on the occasion by the Hon. Daniel Webster, late Secretary of State of the United States.

During the erection of the monument one man was killed by a fall from it; the only serious disaster which occurred. This monument, being the most elevated object in the vicinity, will serve as a landmark to seamen; and will long stand in commemoration of the brave men who fought, and many of them fell, in defence of their country's rights, and

nobly contributed to the independence of the United States. And it is to be hoped, that it will equally testify to posterity of the horrors of war; for many were the widows and orphans which were made on the 17th of June, 1775.

UNITED STATES CAPITOL.

The capitol at the city of Washington is the finest in the United States, and not inferior to any senate-house in the world. It is every way suitable that the representatives of the sovereign people should be accommodated in a building which would do honor to royalty, and be worthy of the most august legislative assembly in the world. The capitol is universally regarded as an honor to the nation. It is elevated 73 feet above tide-water, and affords a commanding view of the different parts of the city and of the surrounding country. The building is of freestone, and covers an area of more than an acre and a half; the length of the front is 352 feet, including the wings; the depth of the wings is 121 feet. The projection on the east or main front, including the steps, is 65 feet wide; and another on the west front, with the steps, is 83 feet wide.

In the projection on the east front, there is a splendid portico of 22 lofty Corinthian col-

umns, 38 feet high; and in the west front there is a portico of 10 Corinthian columns. The height of the building to the top of the dome is 120 feet. Under the dome, in the middle of the building, is the rotunda, a circular room, 95 feet in diameter and of the same height, adorned with sculptures in stone panels in bold relief, containing groups of figures representing Smith delivered by the interposition of Pocahontas, the landing of the Pilgrims on Plymouth rock, and Penn treating with the Indians; and four magnificent paintings by Trumbull, with figures as large as life, representing the presentation to Congress of the Declaration of Independence, in which all the figures, 47 in number, in that august assembly which William Pitt in the British parliament pronounced superior in wisdom to any body of men whom he had ever heard or read of, are correct likenesses; the surrender of Burgoyne to General Gates, the surrender of Cornwallis at Yorktown, and Washington resigning his commission at Annapolis.

To these have recently been added, the baptism of Pocahontas by Chapman, and the embarkation of the Pilgrims by Weir. These paintings possess great merit as works of art, in addition to their commemoration of important events in American history. The rotunda has recently received a splendid additional ornament in Greenough's statue of Washington, a colossal figure in a sitting posture, twice

as large as life. On the west of the rotunda is the library room of Congress, 92 feet long by 34 wide, and is 36 feet in height, containing in arched alcoves over 28,000 volumes.

The foundation of this library, after the burning of the capitol and its library by the British in the last war, was laid by the purchase of the private library of Mr. Jefferson, consisting of about 7,000 volumes, many of them rare and valuable, for $23,000. This library has been enlarged from time to time by an annual appropriation by Congress of $5,000 for the purpose.

In the second story of the south wing of the capitol is the hall of the house of representatives, of a semicircular form, 96 feet long and 60 feet high, with a dome supported by 24 beautiful columns of variegated marble from the Potomac, with capitals of Italian marble of the Corinthian order. The circular wall opposite the speaker is surrounded by a gallery for men; and the chord of the arc, back of the speaker's chair, has a gallery for ladies. The room is ornamented with some fine statuary and paintings, and the whole furniture is elegant. The senate chamber is in the second story of the north wing of the capitol, and is semicircular like that of the representatives, but smaller, being 78 feet long and 45 feet high. The vice-president's chair is canopied with a rich crimson drapery held by the talons of a hovering eagle. A light gallery of bronze,

running round the arc in front of the vice-president's chair, is mainly appropriated to ladies. There is another gallery above and behind the chair supported by fine Ionic columns of variegated marble. A magnificent chandelier hangs in the centre of the room, and the whole appearance of the furniture of the room is splendid.

Below the senate chamber, and nearly of the same form and dimensions, though much less elegant, is the room of the supreme court of the United States, and there are in the building 70 rooms for the accommodation of committees and officers of congress. The grounds around the capitol are spacious, containing 22 acres, highly ornamented with gravelled walks, shrubbery, and trees; a naval monument, ornamented with statuary, erected in honor of the youthful officers who fell in the battle of Tripoli; and fountains, and the whole is enclosed by a handsome iron fence. The whole cost of the building and its accompaniments has exceeded $2,000,000.

NEW YORK CITY HALL.

The City Hall, heretofore regarded as much the finest building in the city, and one of the finest in the United States, has a commanding situation in the middle of the Park, though somewhat in the rear, and shows to great ad-

vantage. It has more ornament than either the Exchange or the Custom House, but less simple grandeur; though with its furniture, it is, perhaps, the most interesting building in the city.

It is 216 feet long and 105 wide. The front and ends are constructed of white marble, and the rear of brown freestone. It is two stories high above the basement, with a third or attic story in the centre building; and there rises from the centre a lofty cupola, containing a city clock of fine workmanship, and on the top a colossal statue of Justice. In the upper part of this cupola is a room occupied by a man, whose business it is to give alarm in cases of fires: and from this elevated position he is able to overlook the whole city. Behind this there is another less elevated cupola, with eight beautiful Ionic columns, which contains the City Hall bell, weighing 6,910 pounds, whose deep and solemn tones often sound the knell of property, and by the different number of strokes indicates the district of the city in which a fire occurs.

The front of the City Hall is ornamented with columns and pilasters of the Ionic, Corinthian, and Composite orders, rising above each other in a regular gradation. The building is entered in front by a flight of 12 marble steps. In the centre is a double staircase of marble steps, at the top of which is a circular gallery floored with marble, from which 10 marble

columns of the Corinthian order ascend to the ceiling, where there is a handsome panelled dome ornamented with stucco, and a skylight which gives light to the interior of the building. There are halls which lead from the centre to each end of the building in each story. In the basement and the stories there are 28 offices and public rooms, the most conspicuous of which are the Governor's Room, and the chambers of the Common Council and Assistant Aldermen.

The *Governor's Room* is appropriated to the use of the governor of the state when he visits the city, and is used as a reception-room for other distinguished men who have occasionally been here. It is 52 by 20 feet. The walls of the room are hung with a fine collection of portraits, including the governors of the state, the mayors of the city since the revolution, some of the Dutch governors, and the principal military and naval heroes of the late war, all of which are regarded as excellent likenesses, and many of them are full-length portraits.

The *Common Council Room* is 42 by 30 feet, and the president occupies the identical chair occupied by General Washington when he presided over the first American Congress which assembled in New York. It is surmounted, as is meet, by a canopy. The seats of the aldermen are arranged in a semicircular form, in the centre of which is the table for the clerk. The room contains several full-

length portraits painted by Trumbull, of which that of Washington is thought to be the best in existence, when he was in the prime of life. The room of the assistant aldermen is handsomely fitted up.

The *Superior Court Room* is very neat and convenient, 42 by 30 feet, and neatly fitted up for its purpose. But he who looks over the several apartments of this building will obtain a higher idea of it, than he can from any concise description. The building was commenced in 1803 and completed in 1812, and cost $538,734.

To the east of the City Hall, in the Park, is the *Hall of Records*, two stories high, with a lofty portico of four Ionic pillars on each front; and in the rear of it is the *New City Hall*, which was the old almshouse, and contains 15 offices, besides the Marine Court Room and the rooms of the American Institute, the latter containing a valuable library and various interesting models of machines.

To the north of the City Hall, between Centre, Elm, Leonard, and Franklin streets, is the *Hall of Justice*, a unique and beautiful building of Egyptian architecture. It is 253 feet long and 200 feet wide, the front of which is occupied by the main building, and other outer portions of which consist of lofty walls, with apartments in some of their parts. Within this enclosure and towards its back, is the house of detention or prison, 142 feet long and

45 feet wide, which is entirely separate from the outer wall and building, and consists of 148 cells for different classes of prisoners.

The court of sessions occupies a part projecting back from the front building, the roof of which is supported by lofty Egyptian columns. From this there is an ascent by twelve steps, between two massive columns, to an open area of 50 feet square, which has eight large columns supporting the ceiling above. From the area there is an entrance to the various offices and apartments of the building.

The windows, which extend to the height of two stories, have massive frames and cornices, ornamented with the winged globe and serpents. The two fronts on Franklin and Leonard streets have each two entrances with two massive columns each ; and the back entrance forms a carriage-way for taking prisoners to and from the house of detention. This building, though handsome of its kind, has a heavy and gloomy aspect, which has acquired for it the name of the *Egyptian Tombs*. It is constructed of a light-colored granite from Hallowell, Maine.

PENNSYLVANIA OLD STATE HOUSE.

The State House, now called Independence Hall, was begun in 1729 and finished in 1735, on the northern side of the square bounded by

Chesnut, Walnut, Fifth, and Sixth streets. The wings, extending from the main building to Fifth and Sixth streets, are of modern construction. The wood work of the steeple, by which the building was first surmounted, was found to be so much decayed, that about the year 1774 it was taken down, leaving only a small belfry to cover the bell for the use of the town clock; and so remained until 1829, when the present steeple was erected on the plan of the original one which had been removed.

The bell for the first steeple was imported from England in 1752, but was broken by accident when first hung up. A new one was cast in Philadelphia, under the direction of Isaac Norris, then speaker of the colonial assembly, to whom we are probably indebted for the remarkable motto inscribed upon it, and which at that early day was little thought to be so singularly prophetic of its future use—"*Proclaim liberty throughout the land, and to all the people thereof.*"

Twenty-four years afterwards a period arrived "in the course of human events," when the memorable Declaration of Independence was signed in the building beneath this very bell, and its joyous tones rang loud and clear as it proclaimed to anxious thousands, that they were now a free and independent people. The chamber in which the Declaration was signed is on the first floor, at the eastern end of the centre building.

Some years since the interior wood was removed to make room for more modern decorations; but a more patriotic feeling and a better taste than those which had dictated this change, soon demanded the restoration of the hall to its original simplicity, and it now presents the same appearance as it did when the representatives of the people, assembled within it, declared these United States to be "free, sovereign, and independent." Such an edifice is surely worthy of being known throughout the land, for the historic associations inspired by it, if not on account of architectural perfection. Every child and every adult in the country should have the benefit of these associations. By such means patriotism is kept alive and the love of liberty is perpetuated.

FORTIFICATIONS OF QUEBEC

This seat of ancient dominion—now hoary with the lapse of more than two centuries—formerly the seat of a French empire in the west—lost and won by the blood of gallant armies and of illustrious commanders—throned on a rock, and defended by all the proud defiance of war, is the strongest town in America, and with the exception of Gibraltar is the strongest in the world. It is situated on a bold promontory, formed at the junction of the river St. Charles with the St. Lawrence, and

rising more than 300 feet above the level of the water.

It is, therefore, possessed of great natural advantages; the lofty perpendicular precipices of rock, which, on the south and east, separate a great part of the lower town from the upper, constitute in themselves, on those sides, one insurmountable barrier; the river St. Charles, with its shallow waters and low flats of sand and mud drained almost dry by the retiring tide, forms an insuperable impediment to the erection of commanding works, or to the location of ships on the east and north, not to mention that all this ground is perfectly commanded by the guns above.

The only vulnerable point is on the west and south from the plains of Abraham. Cape Diamond, the highest point of the town, it is true, is rather more elevated than any part of the plains, but the highest ground on the plains of Abraham commands most of the works on this side of the town; besides, there is no barrier of rock, no river, ravine, marsh, or other natural obstacle to hinder an approach upon this side; this is the vulnerable side of Quebec, and here, therefore, it is fortified with the most anxious care.

The distance across the peninsula, from one river to the other, is very nearly one mile. The circuit within the walls, is two miles and three-quarters; immediately without, it is probably three miles, and the aver-

age diameter is very nearly six-sevenths of a mile.

A complete wall of massy stone, hewn and laid up with elegance as well as strength, completely encircles the town, and is furnished with strong massy arches and gates, and with deep ditches.

The walls vary much, in different parts, in height and thickness. Everywhere, however, they are high enough to render escalade very difficult, and a breach almost hopeless. In the strongest parts, next to the plains of Abraham, they are fifty feet thick and equally high. Even the lofty precipices of naked rock are surmounted with a stone wall and with cannon, and the highest points are crowned with towers and distinct batteries. In general, the curtains of the wall are looped for musketry, and projecting bastions present their artillery towards the assailant in every direction, and of course so as to rake the ditches.

Immediately adjacent to the inner wall, which we have already remarked is fifty feet thick, runs a deep ditch, and then there is an exterior but lower wall and another ditch, both of which must be scaled before the main wall can be approached. A storming party would be dreadfully exposed while mounting this exterior wall. The avenue to the gate St. Louis, which opens to the plains of Abraham, is bounded on both sides by a high wall, and makes several turns in zigzag. At every

turn, cannon point directly at the approacher; and generally down every ditch, and in every possible direction where the wall can be approached, great guns are ready to cut down the assailants.

The promontory of the rock which constitutes the loftiest point of the fortifications, is called Cape Diamond, and upon this is erected the famous citadel of Quebec. This is not, as one might suppose, a building or castle covered with a roof; it is open to the heavens, and differs from the rest of the works only in being more elevated, stronger, and therefore more commanding. The highest part of the citadel is Brock's battery, which is a mound artificially raised, higher than every thing else, and mounted with cannon pointing to the plains of Abraham. From the citadel, the view of the river, of the town, and of the surrounding country, is of course extremely grand and beautiful.

Within the walls are numerous magazines, furnished with every implement and preparation, and more or less proof against the various missiles of war. Piles of cannon balls are everywhere to be seen, and the cannons mounted on the walls and other places amount to several hundred.

Beyond the walls, on the plains of Abraham, are the four Martello towers. They are solidly constructed, about forty feet high, the diameter at the base being about the same, as they

have cannon on their tops. They of course sweep the whole plain and effectually command it; the particular object of their construction is to prevent an enemy from occupying the high ground on the plains of Abraham. These towers are very strong on the side farthest from the town, and weaker on the side next to it, that they may be battered from it should an enemy obtain possession of them. On the whole, Quebec is so strong in its defences and so well garrisoned, that an attempt to take it by any force whatever would undoubtedly prove a fruitless undertaking.

CATACOMBS OF ROME.

Next to the Egyptian catacombs, the most extensive with which the moderns are acquainted, are those of Ancient Rome. Though their antiquity perhaps is not equal to that of some others dispersed throughout the world, an unusual interest is excited by their containing the remains of a people who had rendered themselves so illustrious, and whose history is so familiar to our knowledge.

The Roman catacombs are of great extent. Some maintain, that entering close to the city they stretch several leagues beyond it; but the precise destination and limits of these, if they actually do exist, are not ascertained. Some others have for centuries been frequently

explored; in the course of which, a zealous antiquarian, Anthony Bosio, who has amply elucidated this subject, ventured to pass entire days within them, had provisions carried there, and notwithstanding the danger of the enterprise, traversed their utmost extremities. Yet the hazard of this is great: persons have been known to lose their way; and the passages are of such intricacy, that it is unsafe to penetrate their recesses without a clue.

The catacombs of Rome, like those of most other places, are long, narrow, subterraneous galleries, crossing each other at right angles, or passing off obliquely. Chambers at each side occasionally appear, and a glimmering of light is admitted by openings above, distant by intervals of 300 yards or more. But in the interior it is dark as night. The excavations are invariably under the earth, in the puzzolana whereon the city is built: they are necessarily narrow to preserve the roof, and in some parts are vaulted. Nevertheless, the earth frequently detaches itself from above, and obstructs or totally blocks up the passages. There are cavities along each side, which have formerly been appropriated for the reception of lamps; and deep niches penetrate into the walls, wherein the bodies of the deceased were deposited. These niches are invariably in proportion to the size of the individual; those of women and children being smaller than the rest.

The bodies are regularly arranged in one tier of niches above another, along the sides of the galleries, each niche of sufficient capacity according to the number it was required to contain, and closed at the foot by a single brick. In general, the galleries can admit of a man traversing them with facility, and there two or three rows are seen: in some places they are more lofty; and Bosio relates, that one which he discovered was so high, as to receive eight or ten bodies above each other in the sides.

Parts of the same gallery, however, were so low, that he had to advance bending downward, or crawling on his breast, to the different streets or passages; probably the consequence of the superincumbent earth having given way. The cement by which the tombs are closed, unless where yielding from too great desiccation, is yet entire; and on removing the brick to inspect the interior, the skeletons of the deceased appear in good preservation. In elucidation of this fact, let us quote the words of an adventurous explorer, who recently penetrated these gloomy mansions.

"The brick obstructing the aperture of a catacomb being removed, a body, apparently that of a young woman, was discovered. Even yet all the teeth were preserved in her jaws. Her bones were perfectly covered with stalactites, exhibiting a most singular spectacle;

for the light, reflected by the motion of the torches, seemed to animate the body, and the image of the spectator was multiplied a thousand fold, by the most entire portion of the skull." "Another was opened, wherein a skeleton turned towards the east was seen. The hands were crossed on the breast, and but few teeth were in the jaws; it seemed to be that of an old man. When my guide stretched one arm to the head and the other to the feet, designing to raise the skeleton, it immediately fell into a whitish humid dust. Nothing, except the substance of the teeth, which were eleven in number, remained; the whole skeleton had vanished from view."

The catacombs of Rome, besides the tombs, contain edifices which, in the days of the most prevalent superstitions, were churches, and where it is probable the mysteries of the earlier Christians were celebrated. Many inscriptions are still extant, and elegantly sculptured sarcophagi have been obtained from these catacombs. But above all they abound with paintings in fresco, representing, like those of Egypt, an infinite variety of subjects; and sepulchral lamps, as also vases and lachrymatories, are frequently discovered in tombs which have escaped the pillage of the more barbarous ages.

With respect to the precise era when these cemeteries were constructed, and the persons for whose reception they were appropriated,

we are opposed by many uncertainties. Some ascribe them to the ancient Romans; others bring them to a period about the birth of Christ; and there are not wanting intelligent antiquarians, by whom they are considered as almost solely for a secret deposite of those who suffered martyrdom, while the rage of persecution threatened the extermination of Christians. It is possible that all the three opinions are right.

Though cremation was general among the Romans, we do not learn that it was universally practised: children were not burnt, nor those in a state of servitude; and besides, if we may credit Pliny, this custom was introduced long after the building of the city. Inscriptions prove that many who were not Christians were interred here; and numerous emblems, epitaphs, and histories show, that it was a sepulchre for Christians, among whom were martyrs. The academician of Cortona saw a skull which he conjectured to have been violently separated from the vertebræ of the neck; and Bosio relates, that in opening a tomb, he found a skull cleft by a hatchet, still sticking in it, and observed others apparently fractured by violence.

In another part of the catacombs, there was found a horrible kind of pincers, with which the flesh was torn from the bones of martyrs; and also vessels full of concrete blood, which crumbled to earth, but on being wetted imme-

diately showed its crimson hue. Some of the Roman emperors were deposited in the catacombs of the Vatican. There the body of Honorius was discovered, 1144 years subsequent to his decease, with many jewels and ornaments in his tomb, weighing forty pounds of solid gold.

HISTORY OF MANUFACTURES.

Manufactures may be defined, the arts by which natural productions are brought into the state or form in which they are consumed or used. The principal manufactures are those which fabricate the various articles of clothing; as the woollen manufacture, the leather manufacture in part, the cotton manufacture, the linen manufacture, and the silk manufacture; others supply articles of household furniture, as the manufactures of glass, porcelain, earthenware, and of most of the metals in part; the iron manufacture furnishes implements of agriculture and weapons of war; and the paper manufacture supplies a material for communicating ideas and perpetuating knowledge. Notwithstanding the present pre-eminence of Great Britain in manufactures, they had begun to flourish in various other parts of Europe long before they were attempted in that country; and the few articles needed were obtained from the continent

in exchange for wool, hides, tin, and such other produce as the island in a very uncultivated state could supply.

It was enacted, in 1337, that no wool should be exported; that none should wear any but English cloth; that no cloths made beyond the seas should be imported; that foreign cloth-workers might come into the king's dominions, and should have such franchises as might satisfy them. Before this time, the English were little more than shepherds and wool-sellers. This may be considered the commencement of the splendid career in the political economy of that country. Since their establishment of manufactures, the progress of improvement has in most instances been remarkably great, particularly of late years, in consequence of an increased knowledge of the properties of various materials, vast improvements in all kinds of machinery, and the great capitals invested.

The value of British manufactures, exported to all countries, on an average of six years, ending at the breaking out of the American revolutionary war, was but little more than ten millions sterling—at the present time, it is estimated to exceed forty millions. A most useful lesson in political economy might be learned from the history of that country. For it is well known, that the manufactures of England are of vast extent, and give employment to a large portion of her population; and

such is the ingenuity of her numerous artisans, such are the contrivances invented for the abridgment of labor, such is the minuteness with which the industry of the country is divided; such the perfection to which the workmen, by patient perseverance, each in his own particular task, have brought their respective arts; and lastly, so great is the capital which has been accumulated during ages of successful industry, that England, notwithstanding her heavy taxation and the high wages paid for labor, is still enabled in nearly every country to which her commodities are exported, to undersell the foreign manufacturer in his own market, and to inundate almost every country in the world with English goods.

And it is deemed safe to predict, that if the manufactures of this, or of any other country, should successfully and extensively compete with those of Britain, her present exalted rank among nations cannot be sustained, and, perhaps, her very existence would be jeoparded, unless sources of wealth and of power as yet unknown should come to her aid.

A high degree of perfection in the arts and manufactures is generally found only in countries where there is a high degree of civilization of the inhabitants. The most savage and barbarous nations are ignorant of the art of weaving. They usually make their clothing of the skins of animals. The Tartars, and some other barbarous nations, form a kind of

felt, like that of which our hats are composed, from the wool of sheep, or the hair of camels.

In many of the islands of the Pacific, the natives use mats for their covering, or form a species of cloth from the bark of trees. There are, nevertheless, a few exceptions. The art of weaving is understood by a small number of the barbarous nations of Africa and Asia; but the fabric is produced by a few simple and rude implements, and with very great labor. The weaver fixes his threads to the ground by small stakes in the open air, and removes his singular loom at night. Yet, even in this way, India produces cotton fabrics superior to almost any in the world. Many of the India silks also, the Cashmere shawls, and the carpets of Cabul and Persia, are made in the highest degree of excellence.

WORKING OF METALS.

The working of metals appears to be the foundation of all the arts, and forms the most important employment of civilized man. This fact is the most evident, as the principal tools and instruments used in almost every description of labor are made of metal. Hence, in all countries where there are advances made in civilization, we find corresponding degrees of perfection in the manufacture of this material. England, probably, surpasses every other

nation in this respect, whether we consider the extent, variety, or excellence of its metallic productions. Sheffield is unrivalled in its cutlery; and Birmingham has been called the toy-shop of Europe.

It has been stated, that from the musket establishment of the latter place, no less than 14,500 have been delivered per week, into the ordnance office for the use of government. In Birmingham, also, buttons of every description are manufactured to an incalculable extent; and, it is said, that at the pin works, 12,000 pins can be cut and pointed in an hour.

London and Liverpool produce the best clocks and watches in use; and the former is unrivalled in the construction of mathematical, astronomical, and philosophical instruments. It has been estimated, that the iron, tin, and lead manufactures of that country, may be valued at £10,000,000, employing 200,000 persons; those of copper and brass, may be valued at £3,600,000, employing 60,000 persons; and those of steel, plating, hardware, and toys, may be valued at £4,000,000, employing at least 70,000 persons; making a total amount of £17,600,000, and giving employment to 330,000 persons.

Germany is said to rank next to England in metallic manufactures. In Prussia, many articles are made with peculiar ingenuity and skill. Clocks and watches are made in great numbers, in Switzerland, France, and Germa-

ny; but they are generally inferior in quality to those made in England. Jewellery is manufactured to a great extent in France, Switzerland, and the Netherlands; and France is distinguished for the more elegant metallic articles.

Holland and Germany are remarkable for toys. Turkey, and especially Damascus, has long been celebrated for unrivalled skill in the manufacture of sword-blades and other cutting instruments. The Damascus sabres are of such peculiar quality as to be perfectly elastic; they never break, and iron will yield under their edge. This art has extended to Prussia and some of the neighboring countries. The Japanese are said to surpass the Chinese and Hindoos in working metals, and to make instruments of steel little inferior to those of Turkey.

MANUFACTURE OF GLASS.

The use of glass is too common, and the manufacture of it too important, not to be noticed under this head of our work. Although it is a substance too well known to need definition; and although the process of making it does not come within our proposed limits, it may not be improper to mention, that the various colors, with which it is often tinged, are occasioned by mixing with it, while in fusion,

some one of the metallic oxides. Glass is made to a greater or less extent, in most civilized and half-civilized countries.

France, Austria, Germany, Italy, and England, excel in this manufacture, and produce the finest mirrors and cut glass. The manufacture of crown and cut glass has been carried to a high degree of perfection in our own country; and that of Boston and Pittsburg is advantageously compared with the best made in Europe. In the history of glass there is a fact deserving of record; it is related by Pliny, that the discovery was owing to the following accident. Some merchants, with soda as part of their freight, had cast anchor at the mouth of the river Belus, in Phœnicia, and were dressing their dinner on the sand, making use of large lumps of soda as supports of their kettles. The heat of the fire melted the soda and the silicious earth together: the result was glass. The hint was not lost, and a manufacture in that trading country was instantly established, and to this place it was for a long time confined.

Glass was undoubtedly made in great perfection among the ancients. In their accounts we read of drinking glasses, glass prisms, and colored glasses of various kinds. Glass was first used for windows in the third century of the Christian era, but it did not come into common use till very long after that period. The value of the glass manufactured annually

in England, is £1,500,000 sterling, and about 36,000 persons are constantly employed in the production of it.

MANUFACTURE OF PORCELAIN.

Porcelain, or China-ware as it was originally called, has become an important article of manufacture. It was formerly procured only in China, or of an inferior quality in Japan. It is now manufactured in Berlin, in Dresden, in France, and in England, superior to that obtained from China. The annual value of the earthenware and porcelain manufacture in England, is £2,000,000 sterling, and the number of persons employed in the work is 45,000.

The fine Dresden porcelain, that of Berlin, the French porcelain, and the finer kinds of English porcelain, are manufactured from clay, which, from the use to which it is applied, has received the name of porcelain earth; and which appears, in general, to be derived from the decomposition of the feldspar of granite. Porcelain is also made in Copenhagen, Vienna, and some other parts of Europe.

Other species of earthenware, of a fine quality, are most extensively manufactured in England, France, Germany, Denmark, and the Netherlands. Our own country depends chiefly on England and Germany for porcelain and

the finer kinds of earthenware, having as yet manufactures of an inferior quality only.

CAPITOL OF NEW HAMPSHIRE.

This beautiful edifice is situated in Concord, in the county of Merrimac, upon a gently inclined plane between Main and State streets, and has two regular fronts, east and west. The centre of the building is fifty feet in front by fifty-seven in depth; the wings are each thirty-eight feet in front by forty-nine in depth; the whole making a parallelogram of one hundred and twenty-six feet in length, by forty-nine in width, with the addition of a projection in the centre of each front of four feet. It is two stories above the basement, which rises five feet above the surface of the ground; the first story is nineteen feet, the second eighteen feet in the wings, and thirty-one in the centre.

The roofs of the wings are levelled at the outer ends, and rise ten feet against the body of the centre; the roof of the centre rises thirteen, presenting gable ends in front; from the middle of which the cupola rises, eighteen feet square, to the height of fifteen feet above the ridge, thence in an octangular form thirteen feet, in diameter seventeen feet, and is covered with a roof in the form of an inverted acorn, rising to the height of nine feet, and surmounted with a gilt ball, thirty-three inches in di-

ameter, on which stands an eagle, six and a half feet in height, with its wings partially expanded. Each front has in its lower story three doors and six windows, and in its upper story, nine windows with a semi-elliptical window in each gable end; four windows in the south and two in the north end.

The outside walls of the building are of granite stone, hammered and built in a plain style; the only ornament being a Tuscan frontispiece of stone-work at each central front door. The roof and cupola are of wooden materials. The roof is ornamented with a coving appropriate to the Doric order, and a balustrade upon the wings. The square part of the cupola is ornamented with twelve Ionic columns, three at each corner, placed in a triangular position, with an appropriate coving and balustrade. The octangular part has one Ionic column at each corner, surmounted with an urn.

In the second story of the centre is the Representatives' chamber, with an arched ceiling rising thirty feet from the floor, elegantly finished with stucco work. The north wing contains the Senate-chamber, eighteen feet in height, with a beautiful ceiling of plastering, ornamented with stucco work, supported by four Ionic columns and an equal number of pilasters. This room, for its neatness and elegance of finishing, is not perhaps inferior to any in the United States. In the south wing

are contained the Council-chamber and ante-chamber, both of which are finished in a handsome style. In the same wing in the lower story, which is divided into two parts, are the Secretary's and Treasurer's offices, over which is a suite of committee-rooms.

In the north wing, under the Senate-chamber, is a spacious room intended for public hearings before committees of the legislature. This room is also conveniently arranged, and is sufficiently commodious for the accommodation of the Superior Court when holding a law term. Under the Representatives' chamber is an open area, in which are eight Doric columns supporting the flooring above. This area, with the adjacent passages in the wings, cooled by the current of fresh air passing through the spacious doors and windows opening into them, affords, in the warm month of June, a delightful retreat to legislators, when fatigued by long attention to their arduous duties, or heated by the ardor of debate above stairs; and it is by no means an uncommon case to see them availing themselves of the benefits of this pleasant retirement.

The lot on which the State House stands contains something more than two acres, enclosed on its sides with a solid wall of hammered stone about five feet high; the front fences are of stone posts and sills, and iron castings, with gates of the same material.

ANATOMICAL DISSECTIONS

Dissection, literally, is the cutting to pieces any part of an animal or vegetable for the purpose of examining its structure. The dissection of the human body was but little practised by the ancients. The old Egyptians held it in great abhorrence, and even pursued with stones those men, who in embalming the dead were obliged to cut open their bodies. The Greeks were prevented by the principles of their religion from studying anatomy, since these required them to bury the bodies of the deceased as soon as possible.

Even in the time of Hippocrates anatomical knowledge was imperfect, and was probably derived from the dissection of animals; the skeleton, however, was better known. When in later times, under the Ptolemies, Alexandria, in Egypt, became the seat of the arts and sciences, anatomy was also brought to a high degree of perfection, by Herophilus of Chalcedon, 300 B. C., and by Erasistratus of Chios. According to the testimony of Celsus, the former obtained permission to open living animals.

Since that period, with the increase of knowledge generally, the prejudice against dissections has been subsiding; and the familiar acquaintance with the human structure, alone to be obtained in this manner, is now deemed essential in the education of a skilful surgeon.

Among the Arabians, anatomy was not practised ; it was forbidden in their religion. Their physicians, therefore, took their anatomical information merely from the writings of the Greeks, particularly from those of Galen. Thus anatomy was checked in its progress for several centuries.

Finally, in the fourteenth century, individuals arose, who, not satisfied with the anatomical instruction of the age, ventured to make investigations of their own. The superstitious fear of the dissection of human corpses, which had hitherto prevailed, appeared to subside by degrees, when a philosophical spirit gave birth to more liberty of thought. Mondini di Luzzi, professor at Bologna, first dissected two corpses, in 1315, and soon afterwards published a description of the human body, which for a long time was the common compendium of anatomy, though many errors were contained in it.

From this time it became customary, in all universities, to make public dissections once or twice a year. Anatomy, however, made but slow progress, since the dissections were intended only as illustrations of the writings of Galen and the compendium of Mondini. Montagnana alone, professor of Padua in the fifteenth century, could boast of having performed fourteen dissections, which was then a great number.

PORCELAIN TOWER AT NANKIN.

This elegant and commodious building may be regarded as a fine specimen of oriental pagodas. The tower is about two hundred feet in height, and derives its name from having a china or porcelain coating. The Portuguese were the first to bestow on these superb edifices the title of pagodas, and to devote them to devotional purposes. There can be little doubt, however, that in many instances they have been rather erected as public memorials or ornaments, like the columns of the Greeks and Romans.

Mr. Ellis, in his journal of the late embassy to China, relates that, in the company of three gentlemen of the embassy, he succeeded in passing completely through the uninhabited part of the city of Nankin, and in reaching the gateway visible from the Lion Hill. The object of the party was to have penetrated through the streets to the Porcelain Tower, apparently distant two miles. To this, however, the soldiers who accompanied them, and who, from their willingness in allowing them to proceed thus far, were entitled to consideration, made so many objections, that they were forced to desist, and to content themselves with proceeding to a temple on a neighboring hill, from which they had a complete view of the city. From this station the Porcelain Tower presented itself as a most magnificent object.

EGYPTIAN TOMBS AND MUMMIES.

Gournou is a tract of rocks, about two miles in length, at the foot of the Lybian mountains, on the west of Thebes, and was the burial-place of the great city of a hundred gates. Every part of these rocks is cut out by art, in the form of large and small chambers, each of which has its separate entrance; and though they are very close to each other, it is seldom that there is any interior communication from one to another. I can truly say, it is impossible to give any description sufficient to convey the smallest idea of those subterranean abodes and their inhabitants. There are no sepulchres in any part of the world like them; there are no excavations, or mines, that can be compared to these truly astonishing places; and no exact description can be given of their interior, owing to the difficulty of visiting these recesses. The inconvenience of entering into them is such, that it is not every one who can support the exertion.

A traveller is generally satisfied when he has seen the large hall, the gallery, the staircase, and as far as he can conveniently go: besides, he is taken up with the strange works he observes cut in various places, and painted on each side of the walls; so that when he comes to a narrow and difficult passage, or a descent to the bottom of a well or cavity, he declines taking such trouble, naturally suppos-

ing that he cannot see in these abysses any thing so magnificent as what he sees above, and consequently deeming it useless to proceed any farther.

Of some of these tombs many persons could not withstand the suffocating air, which often causes fainting. A vast quantity of dust rises, so fine that it enters into the throat and nostrils, and chokes the nose and mouth to such a degree, that it requires great power of lungs to resist it, and the strong effluvia of the mummies. This is not all; the entry or passage where the bodies are, is roughly cut in the rocks, and the falling of the sand from the upper part or ceiling of the passage causes it to be nearly filled up. In some places there is not more than a vacancy of a foot left, which you must contrive to pass through in a creeping posture like a snail, on pointed and keen stones, that cut like glass.

After getting through these passages, some of them two or three hundred yards long, you generally find a more commodious place, perhaps high enough to sit. But what a place of rest! surrounded by bodies, by heaps of mummies in all directions; which, previous to my being accustomed to the sight, impressed me with horror. The blackness of the wall, the faint light given by the candles or torches for want of air, the different objects that surrounded me, seeming to converse with each other, and the Arabs with the candles or

torches in their hands, naked and covered with dust, themselves resembling living mummies, absolutely formed a scene that cannot be described.

In such a situation I found myself several times, and often returned exhausted and fainting, till at last I became inured to it, and indifferent to what I suffered, except from the dust, which never failed to choke my throat and nose; and though, fortunately, I am destitute of the sense of smelling, I could taste that the mummies were rather unpleasant to swallow.

After the exertion of entering into such a place, through a passage of fifty, a hundred, three hundred, or perhaps six hundred yards, nearly overcome I sought a resting place, found one, and contrived to sit; but when my weight bore on the body of an Egyptian, it crushed like a band-box. I naturally had recourse to my hands to sustain my weight, but they found no better support; so that I sank altogether among the broken mummies, with a crash of bones, rags, and wooden cases, which raised such a dust as kept me motionless for a quarter of an hour, waiting till it subsided again. I could not remove from the place, however, without increasing it, and every step I took I crushed a mummy in some part or other.

Once I was conducted from such a place to another resembling it, through a passage of

about twenty feet in length, and no wider than what a body could be forced through. It was choked with mummies, and I could not pass without putting my face in contact with that of some decayed Egyptian; but as the passage inclined downward, my own weight helped me on; however, I could not avoid being covered with bones, legs, arms, and heads, rolling from above. Thus I proceeded from one cave to another, all full of mummies piled up in various ways, some standing, some lying, and some on their heads.

The purpose of my researches was to rob the Egyptians of their papyri; of which I found a few hidden in their breasts, under their arms, in the space above the knees, or on the legs, and covered by the numerous folds of cloth that envelop the mummy. The people of Gournou, who make a trade of antiquities of this sort, are very jealous of strangers, and keep them as secret as possible; deceiving travellers, by pretending that they have arrived at the end of the pits, when they are scarcely at the entrance.

I must not omit, that among these tombs we saw some which contained the mummies of animals intermixed with human bodies. There were bulls, cows, sheep, monkeys, foxes, bats, crocodiles, fishes, and birds in them: idols often occur; and one tomb was filled with nothing but cats, carefully folded in red and white linen, the head covered by a mask re-

presenting the cat, and made of the same linen. I have opened all these sorts of animals. Of the bull, the calf, and the sheep, there is no part but the head which is covered with linen, and the horns project out of the cloth; the rest of the body being represented by two pieces of wood, eighteen inches wide and three feet long, in a horizontal direction, at the end of which was another placed perpendicularly, two feet high, to form the breast of the animal.

The calves and sheep are of the same structure, and large in proportion to the bulls. The monkey is in its full form, in a sitting posture. The fox is squeezed up by the bandages, but in some measure the shape of the head is kept perfect. The crocodile is left in its own shape, and after being well bound round with linen, the eyes and mouth are painted on this covering. The birds are squeezed together and lose their shape, except the ibis, which is found like a fowl ready to be cooked, and bound round with linen like all the rest.

The next sort of mummy that drew my attention, I believe I may with reason conclude to have been appropriated to the priests. They are folded in a manner totally different from the others, and so carefully executed, as to show the great respect paid to those personages. The bandages are stripes of red and white linen intermixed, covering the whole body, and producing a curious effect from the

two colors. The arms and legs are not enclosed in the same envelope with the body, as in the common mode, but are bandaged separately, even the fingers and toes being preserved distinct. They have sandals of painted leather on their feet, and bracelets on their arms and wrists. They are always found with the arms across the breast, but not pressing it; and though the body is bound with such a quantity of linen, the shape of the person is carefully preserved in every limb. The cases in which mummies of this sort are found, are somewhat better executed, and I have seen one that had the eyes and eyebrows of enamel, beautifully executed in imitation of nature.

The dwelling-place of the natives is generally in the passages, between the first and second entrance into a tomb. The walls and the roof are as black as any chimney. The inner door is closed up with mud, except a small aperture sufficient for a man to crawl through. Within this place the sheep are kept at night, and occasionally accompany their masters in their vocal concert. Over the doorway there are always some half-broken Egyptian figures, and the two foxes, the usual guardians of burial-places. A small lamp, kept alive by fat from the sheep, or rancid oil, is placed in a niche in the wall, and a mat is spread on the ground; and this formed the grand divan wherever I was.

There the people assembled round me, their

conversation turning wholly on antiquities. Such a one had found such a thing, and another had discovered a tomb. Various articles were brought to sell to me, and sometimes I had reason to rejoice at having stayed there. I was sure of a supper of milk and bread served in a wooden bowl; but whenever they supposed I should stay all night, they always killed a couple of fowls for me, which were baked in a small oven heated with pieces of mummy cases, and sometimes with the bones and rags of the mummies themselves. It is no uncommon thing to sit down near fragments of bones: hands, feet, or skulls, are often in the way; for these people are so accustomed to be among the mummies, that they think no more of sitting on them than on the skins of their dead calves. I also became indifferent about them at last, and would have slept in a mummy pit as readily as out of it.

Here they appear to be contented. The laborer comes home in the evening, seats himself near his cave, smokes his pipe with his companions, and talks of the last inundation of the Nile, its products, and what the ensuing season is likely to be. His old wife brings him the usual bowl of lentils and bread moistened with water and salt, and when she can add a little butter, it is a feast. Knowing nothing beyond this, he is happy. The young man's chief business is to accumulate the amazing sum of a hundred piastres, (eleven dollars and

ten cents,) to buy himself a wife, and to make a feast on the wedding-day.

If he have any children, they want no clothing: he leaves them to themselves till mother Nature pleases to teach them to work, to gain money enough to buy a shirt or some other rag to cover themselves; for while they are children they are generally naked or covered with rags. The parents are roguishly cunning, and the children are schooled by their example, so that it becomes a matter of course to cheat strangers. Would any one believe that in such a state of life, luxury and ambition exist? If any woman be destitute of jewels, she is poor, and looks with envy on one more fortunate than herself, who perhaps has the worth of half-a-crown round her neck; and she who has a few glass beads, or some sort of coarse coral, a couple of silver brooches, or rings on her arms and legs, is considered as truly rich and great. Some of them are as complete coquettes in their way as any to be seen in the capitals of Europe.

When a young man wants to marry, he goes to the father of the intended bride, and agrees with him what he is to pay for her. This being settled, so much money is to be spent on the wedding-day feast. To set up housekeeping nothing is requisite but two or three earthen pots, a stone to grind meal, and a mat, which is the bed. The spouse has a gown and jewels of her own; and if the bride-

groom present her with a pair of bracelets of silver, ivory, or glass, she is happy and fortunate indeed.

The house is ready, without rent or taxes. No rain can pass through the roof; and there is no door, for there is no want of one, as there is nothing to lose. They make a kind of box of clay and straw, which, after two or three days' exposure to the sun, becomes quite hard. It is fixed on a stand, an aperture is left to put all their precious things into it, and a piece of mummy-case forms the door. If the house does not please them, they walk out and enter another, as there are several hundreds at their command; I might say several thousands, but they are not all fit to receive inhabitants.

BURIAL-PLACES NEAR CONSTANTINOPLE.

A DENSE and motionless crowd of stagnant vapors ever shrouds these dreary realms. From afar a chilling sensation informs the traveller that he approaches their dark and dismal precincts; and as he enters them, an icy blast, rising from their inmost bosom, rushes forth to meet his breath, suddenly strikes his chest, and seems to oppose his progress. His very horse snuffs up the deadly effluvia with signs of manifest terror, and, exhaling a cold and clammy sweat, advances reluctantly over a hollow ground, which shakes as he

treads it, and loudly re-echoes his slow and fearful step.

So long and so busily has time been at work to fill this chosen spot—so repeatedly has Constantinople poured into this ultimate receptacle almost its whole contents, that the capital of the living, spite of its immense population, scarce counts a single breathing inhabitant for every ten silent inmates of this city of the dead. Already do its fields of blooming sepulchres stretch far away on every side, across the brow of the hills and the bend of the valleys; already are the avenues which cross each other at every step in this domain of death so lengthened, that the weary stranger, from whatever point he comes, still finds before him many a dreary mile of road between marshalled tombs and mournful cypresses, ere he reaches his journey's seemingly receding end; and yet, every year does this common patrimony of all the heirs to decay still exhibit a rapidly increasing size, a fresh and wider line of boundary, and a new belt of young plantations, growing up between new flower-beds of graves.

As I hurried on through this awful repository, the pale, far-stretching monumental ranges rose in sight, and again receded rapidly from my view in such unceasing succession, that at last I fancied some spell possessed my soul, some fascination kept locked my senses; and I therefore still increased my speed, as if

only on quitting these melancholy abodes I could hope to shake off my waking delusion. Nor was it until, near the verge of the funereal forest through which I had been pacing for a full hour, a brighter light again gleamed athwart the ghost-like trees, that I stopped to look round, and to take a more leisurely survey of the ground which I had traversed.

"There," said I to myself, "lie, scarce one foot beneath the surface of a swelling soil, ready to burst at every point with its festering contents, more than half the generations whom death has continued to mow down for near four centuries in the vast capital of Islamism. There lie, side by side, on the same level, in cells the size of their bodies, and only distinguished by a marble turban somewhat longer or deeper, somewhat rounder or squarer, personages in life far as heaven and earth asunder, in birth, in station, in gifts of nature, and in long-labored acquirements. There lie, sunk alike in their last sleep, alike food for the worm that lives on death, the conqueror who filled the universe with his name, and the peasant scarce known in his own hamlet; Sultan Mahmoud, and Sultan Mahmoud's perhaps more deserving horse; elders bending under the weight of years, and infants of a single hour; men with intellects of angels, and men with understandings inferior to those of brutes; the beauty of Georgia, and the black of Sennaar: viziers, beggars, heroes, and women.

"There, perhaps, mingle their insensible dust, the corrupt judge and the innocent he condemned, the murdered man and his murderer, the master and his meanest slave. There vile insects consume the hand of the artist, the brain of the philosopher, the eye which sparkled with celestial fire, and the lip from which flowed irresistible eloquence. All the soil pressed by me for the last two hours, was once animated like myself; all the mould which now clings to my feet, once formed limbs and features similar to my own.

"Like myself, all this black unseemly dust once thought, and willed, and moved! And I, creature of clay like those here cast around; I, who travel through life as I do on this road, with the remains of past generations strewed along my trembling path; I, whether my journey last a few hours more or less, must still, like those here deposited, shortly rejoin the silent tenants of some cluster of tombs, be stretched out by the side of some already sleeping corpse, and while time continues its course, have all my hopes and fears—all my faculties and prospects—laid at rest on a couch of clammy earth."

THE END.

RV-63

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